101

Syllabus

NEW DIMENSIONS IN EDUCATION TECHNOLOGY

OCTOBER 2001 • VOLUME 15, NO. 3

A 101communications Publication

The Globalization of .edu

The Art of Controlling Chaos • Online Faculty Productivity • Wireless Networking

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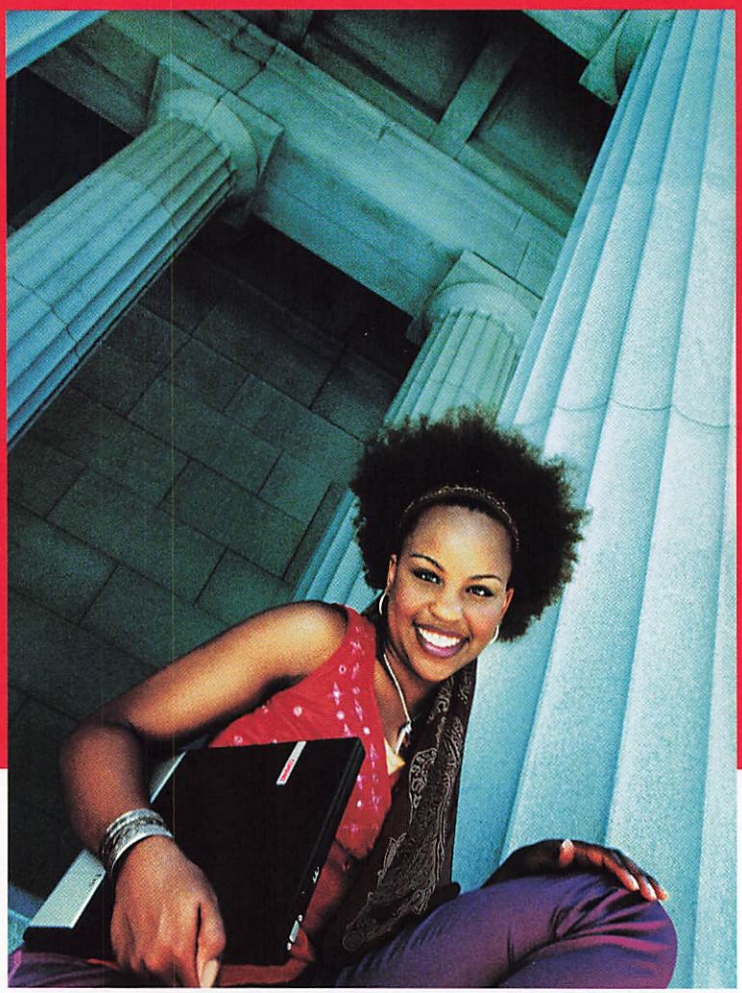

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fall2001 Boston Area Education Technology Conference & Exhibition

Main conference
Thursday and Friday, November 29-30

Post-conference workshops
Saturday and Sunday, December 1-2

Next Steps: Moving Forward with Campus IT

Once again, Syllabus will bring leaders in education technology together in the Boston area in the fall. This year's conference examines the central themes and key technologies that have become increasingly important to diverse constituent groups in higher education as they move forward together with strategic technology planning and innovation.

Syllabus fall2001 is a conference for faculty, administrators, and IT professionals who want to explore the latest applications of information technology in higher education institutions. It provides a collegial environment in which attendees can exchange experiences with campus IT, encounter exemplary implementations of new technologies for teaching and administration, and discover how new media are best integrated into the teaching and learning process.

Conference Features

The need for coordination among stakeholders in the technology decision-making process – faculty, IT, and administrators – is acknowledged and facilitated through various session formats and presentation types, along with ample opportunities for networking and peer interaction.

The wide variety of conference activities and session types offered at the conference will provide attendees with exposure to experts and visionaries, a chance to see case studies by teaching faculty and technology staff, and time to meet with attendees from other institutions, both informally and in structured sessions.

- Keynotes
- Featured panel
- Exhibits
- Technology classrooms
- Breakout sessions
- Featured track
- Poster sessions
- Post-conference workshops and seminars

Tracks

1. **New Technologies Update**
2. **Technology Infrastructure and IT Planning Issues**
3. **Web-Based and Online Environments for Teaching and Administration**
4. **Evaluation and Assessment Strategies**
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   Owning, Sharing, or Stealing Online? Testing the Digital Realm

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November 29-December 2, 2001
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Syllabus

Keynote Speakers

Thursday, November 29

Carl Berger
University of Michigan

The Next Killer App, or... So You Thought Your Change in Administrative Computing Was Expensive...

Carl Berger, Ed.D., is currently Professor of Science and Technology Education and Director of Advanced Academic Technologies in CARAT (The Collaboratory for Advanced Research and Academic Technologies), Office of the Provost, at University of Michigan-Ann Arbor.

Friday, November 30

Kathy Christoph
University of Wisconsin-Madison

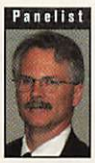
Targeting the Transformation of Teaching and Learning Through Technology

Kathy Christoph is Director of Academic Technology Solutions at the University of Wisconsin-Madison, Division of Information Technology. She is also Assistant Provost/Vice Chancellor.

Featured Panel

Friday, November 30

Open Source Software: A Sustainable Model for the Next Generation of the Internet?



Phillip D. Long, Ph.D. *(moderator), is a Senior Strategist for the Academic Computing Enterprise at MIT*

Henry Schaffer *is the Coordinator of Special IT Projects and Professor of Genetics and Biomathematics at North Carolina State University*

Christopher Etesse *is Director of Technology and Commerce at Blackboard Inc.*

Fees and Registration

Conference Fees

❑ **Thursday/Friday conference only** **$465**
(Includes breaks, lunch, and materials)

❑ **1 full-day hands-on workshop or seminar only** **$265**
(Includes breaks, lunch, and materials)

❑ **1/2 day hands-on workshop or seminar only** **$205**
(Includes breaks and materials)

Note: A complete listing of workshops and seminars is posted on SyllabusWeb (**www.syllabus.com**)

Savings Options

❑ **Platinum Passport (a savings of $300)** **$695**
Conference plus two full-day hands-on workshops/seminars

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❑ **Silver Passport (a savings of $155)** **$575**
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EDITOR'S NOTE

Mary Grush, Editor

As more courses and programs go online as distance education offerings on the Web, the geographical boundaries of our institutions blur. We're accustomed to sharing courses across state lines, and have long pondered the pedagogical and administrative considerations of doing so. But what about education being offered online by U.S. institutions to students in foreign countries? We'll see many changes in the coming years, as we observe "the globalization of .edu."

Our lead feature article, "Reaching Across Boundaries: The Bryant College-Belarus Connection," by Gaytha Langlois, Judy Litoff, and Joseph Ilacqua, relates one institution's experience offering a collaborative learning program between Bryant College and students in Belarus (page 12). The authors describe the cultural differences that affect how students interact. In Belarus, student expectations lean more towards a "sage on the stage" approach to education, and students are less likely to debate issues in discussion forums or to take advantage of the spontaneity of electronic e-mail exchanges.

But there are many other important economic, strategic, and political implications that institutions would do well to recognize or at least try to anticipate before attempting to export education. This is particularly true for degree or certificate programs. At this point it might be easier to set a degree program in motion in a foreign country than in a neighboring state, given all the necessary accreditation hoops to jump through in this country. But when the Department of Commerce begins to track education exports more formally, new regulations may make the process of offering online programs in foreign countries infinitely more complex.

Besides the potential formalities in store for institutions offering online programs in foreign countries, it's clear that they face many other strategic challenges. As some educators have learned the hard way, you can send CD-ROMs to remote locations, but there may not be adequate computers—or even electricity! Current advice from those who have offered such programs is to take enough time to study the environment carefully, both from technology infrastructure and cultural points of view. We'll be following several more international efforts and reporting their stories in future issues of *Syllabus*. If you are offering a course or program internationally online, I would be interested in hearing from you. (E-mail mgrush@syllabus.com or submit editorial at www.syllabus.com.)

On page 22, you'll find a Call for Papers for Syllabus2002, our annual summer conference, to be held July 27-31 at the Santa Clara Convention Center in the heart of the Silicon Valley. Consider presenting at Syllabus2002—our ninth annual summer conference.

"Moving Forward with Campus IT" is the theme of Syllabus fall2001, our next conference, to be held in the Boston area November 29-December 2. Please see the basic conference information on page 4 and take a look at the full conference program on the Web at www.syllabus.com/fall2001. I hope to see you there!

Enjoy this issue of *Syllabus*!

Mary Grush

Letters to the editor should be addressed to the editor and sent to 345 Northlake Drive, San Jose, CA 95117 or via electronic mail. We reserve the right to edit all submissions. **News and product information** will be considered for publication. Please send all materials to Cheryll Linthicum. If you are interested in writing for *Syllabus*, please send a brief description of your article idea along with writing samples to the editor at the above address.

Syllabus
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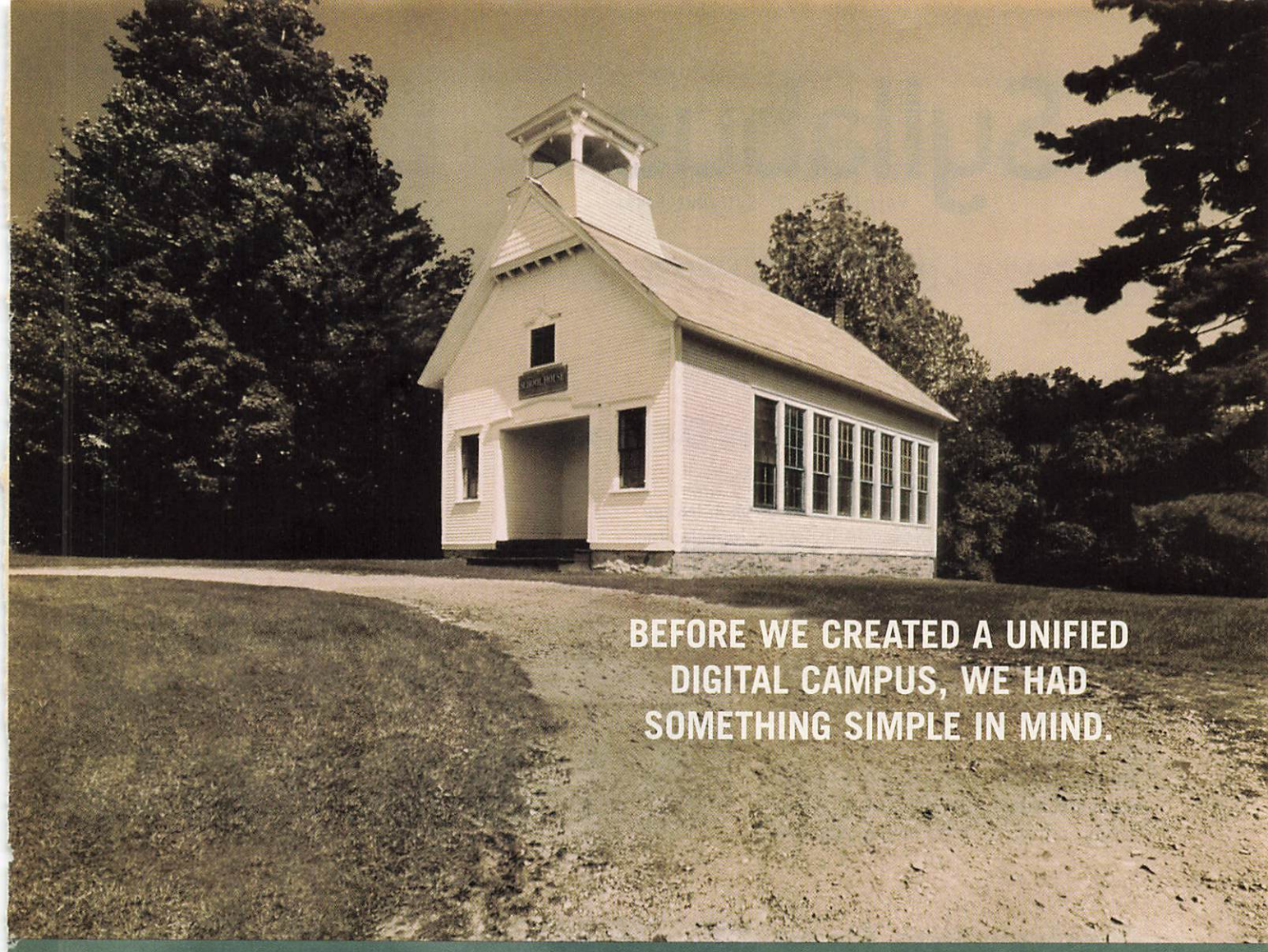

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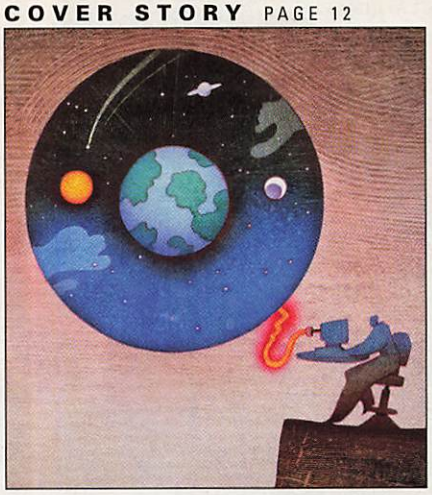

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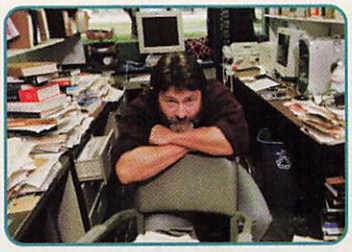

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*IDC-The State of Technology Usage in Higher Education Institutions (03/01); Meta Group: ROI and the Cost of Ownership Teleconference 068

Phillip D. Long

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TRENDS

AN INFORMATION RESOURCE OF INTEREST TO EDUCATORS

Briefs

■ **Duke University,** in an effort to stop Internet plagiarism, recently purchased a license for its faculty to use turnitin.com. This Web site tries to determine whether papers have been copied. ■ A multi-million dollar Lilly Endowment grant will allow **Indiana University** to create three Pervasive Technology labs to research diverse aspects of pervasive computing. ■ Representatives of the higher education and research community in Thailand recently signed an agreement with **Internet2** to collaborate on the development of advanced networking technologies and applications. ■ **NEC Electronics** recently announced its establishment of a Technology Incubation Group to enable technology research and development through investments in promising early stage Silicon Valley companies and partnerships with local universities. ■ **XanEdu** recently announed the launch of its Education Research Engine for pre-service and in-service teachers. ■ Visitors can see tools and techniques in interactive streaming media at http://icanstream.tv **iCanStream.tv**, an online streaming media education channel.

For these and other news stories, or to subscribe to the weekly Syllabus e-News, Resources, and Trends, visit www.syllabus.com.

I Have Seen the Internet, and It Is Us

The early days of the Internet were wild and wooly times. Everyone had the ability to author, critique, publish, or simply read the content produced by fellow travelers in cyberspace. There was promise for a level playing field that did not favor kings, presidents, or the traditional power elite. Dave Clark of M.I.T. once said of those developing the Internet, "We believe in rough consensus and running code."

But warning signs began to emerge, a paradox replacing the promise. The most significant breakthrough in communications technology since the telephone seemed to reduce social involvement and psychological well-being. Robert Kraut and his colleagues at Carnegie Mellon University published in 1998 a sobering view of the Internet as a place of psychological danger marked by depression and anomie. Social scientists looking at life online began to document examples of "group polarization." This phenomenon occurs where like-minded people in isolated groups reinforce one another's views, tilting them toward increasingly extreme positions. Yet exposure to a wide range of opinions and ideas is central to preventing community fragmentation. A world of seemingly limitless choices can transform citizens into mere consumers, eroding common political life.

Now, three years later, Kraut, et al.'s critical study has been extended as he carefully followed his original sample as part of a continuing longitudinal study. His new results suggest that the picture is, well, evolving. The Internet has matured and the gloss of its youth has turned to reflect increasingly the diverse nature of it user community, if "community" can still be used to describe its users.

These latest results mirror a change in online users who now comprise a much more representative cross-section of the U.S. population. After all, 60 percent of U.S. households own a computer, and average online use is 20.7 hours per week (as of July, 2001), increasing the likelihood that people will find others like themselves in cyberspace.

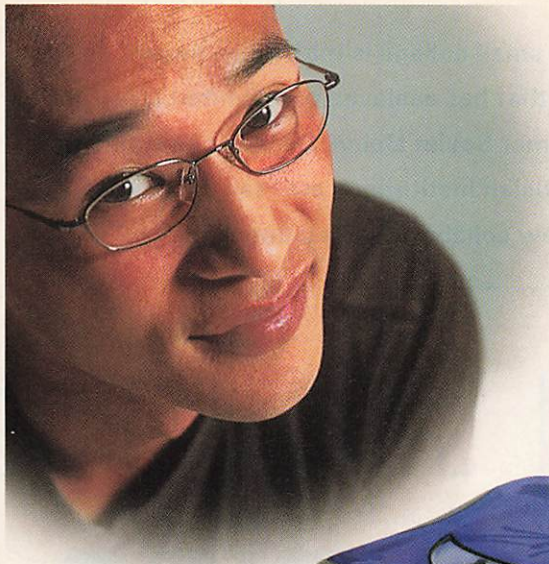
It's important to remember when Kraut's original study began. The year was 1995. The majority of the users of the nascent Internet were a self-selected group of technologies and early computer aficionados. To do this experiment the CMU study population was recruited with incentives that include computer training and subsidies for online expenses. These subjects were naive computer users—good in an experimental sense, as they represented a cross-section of average people. However, they joined a largely techno-geek community of early Web adopters. That they did not find many others like themselves is, in retrospect, hardly surprising.

Internet users today tend to log on with something in mind to accomplish. They no longer predominantly explore. They are not pioneers of the medium. They just want to get something done more easily, faster, and cheaper. These utilitarian expectations transform the Internet from more than a place to inhabit, but to a place to do. What users will be allowed to do is shaped by how it is built. In his 1999 book *Code and Other Laws of Cyberspace*, Lawrence Lessig tells us, "We can build, or architect, or code Cyberspace to protect values that we believe are fundamental, or we can build, or architect, or code Cyberspace to allow those values to disappear." The Internet is indeed a reflection of us.

Kraut, R.M., et al. "Internet Paradox: A Social Technology that Reduces Social Involvement and Psychological Well-being?" *American Psychologist*, 1998:53(9), 1017-1031.

Lessig, Lawrence. *Code, and Other Laws of Cyberspace.* New York: Basic Books. 1999.

Required Tools For School



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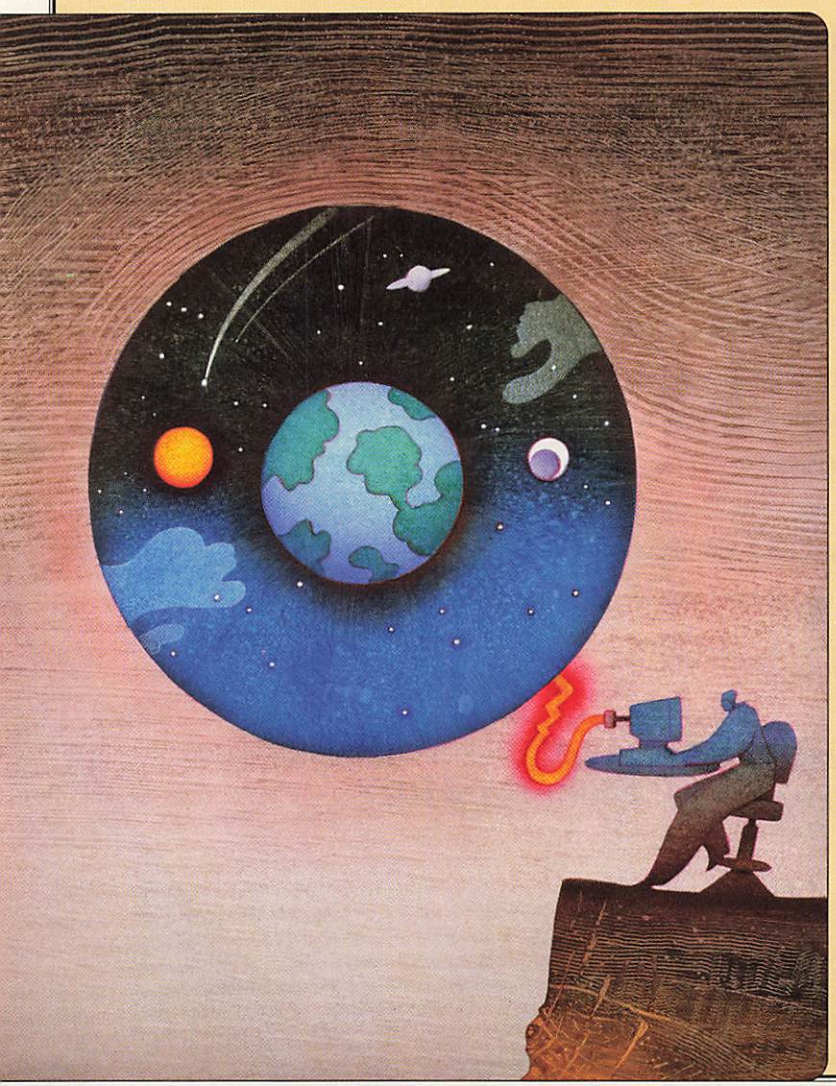
Using the Internet's sphere of influence, one small college is making an impact on the education of students in Belarus, a country that has achieved only limited structural reform since its independence from the former Soviet Union. Despite the country's economic isolation from the West, Belarusian institutions are reaching across traditional boundaries to forge new collaborative relationships.

Reaching Across Boundaries

The Bryant College-Belarus Connection



Emerging national consciousness in the Newly Independent States (NIS) of Europe has produced dramatic alterations in business, politics, economics, technology, and culture, requiring innovative educational methodologies that better match the needs of these countries in transition. In 1996, in response to these challenges, Bryant College spearheaded the Collaborative Learning at a Distance (CLD) program between Bryant and Belarus. This comprehensive joint venture is an excellent model for using Internet technologies to advance collaborative learning, communication competencies, and policy making.

In implementing the CLD Program, we encountered many philosophical, logistical, and technical challenges. Two distinctly different Belarusian institutions, the Information Technologies Center (ITC) of the National Academy of Sciences of Belarus and the European

by Gaytha A. Langlois, Judy Barrett Litoff, Joseph A. Ilacqua
BRYANT COLLEGE

Humanities University (EHU), bridged political boundaries to create a close working relationship between a state (government-owned) and non-state (private) institution. The shared enthusiasm of the ITC and EHU for the CLD Program enabled them to overcome their political differences.

A Non-Hierarchical Approach

The program uses a non-hierarchical model, emphasizing reciprocal, interactive learning across national and academic boundaries (see figure). It is based on our belief that learning is a collaborative process and that we learn better when we teach each other and learn in multiple ways. Our Internet-based CLD Program focuses on a small-scale, personalized interactive learning experience, which directly involves the teacher/mentor, student/learner, and all other stakeholders in the process.

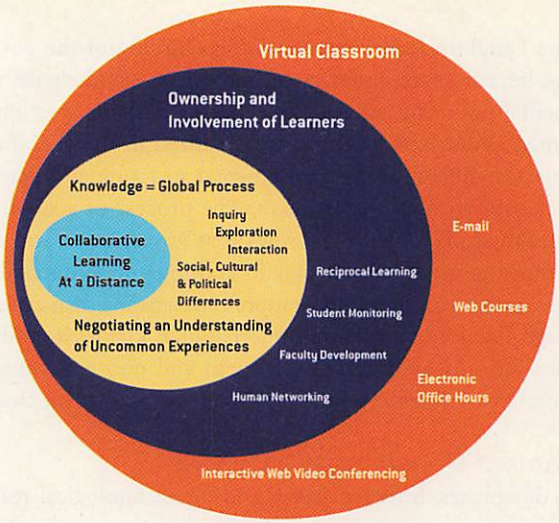
This non-heirarchical pedagogical approach is relatively unfamiliar to university educators in the NIS. A history of centralized education and strong governmental control over curricula has resulted in a teaching environment that does not encourage the interactive exchange of ideas between faculty and students. At a time when funding for educational innovation in the NIS has been curtailed, cost-effective, collaborative distance learning projects can help address the problem of dwindling educational resources and compensate for the legacy of 70 years of communism.

Fostering Collaboration

Collaborative projects—including seminars for scientists and engineers who worked for the Soviet defense industry, distance learning courses, and the development of environmental policy initiatives with the National Academy of Sciences of Belarus—have been led by scholars representing diverse academic disciplines. These projects have utilized a wide array of information technologies, including International Virtual Roundtable Discussions via e-mail, seminars on Web site construction, Microsoft NetMeeting conferencing between the U.S. and Belarus, software training and development, and the use of the Internet to promote collaborative learning across diverse cultural and political boundaries. (The entire CLD Program is available at http://web.bryant.edu/~history/new/course.htm).

Using these technologies, faculty, students, and entrepreneurs in the U.S. and Belarus have formed strong ties. Faculty exchanges have permitted collaborators to teach at participating universities, conduct research, present training programs, lead trade missions, and deliver papers at international conferences. On-site visits, ranging in length from six days to six months, have played a critical role in our ability to develop trusting relationships and set the CLD Program in motion. We have learned that even sophisticated distance learning technologies cannot replace the power and intensity of human interactions.

Student-centered, collaborative group projects, standard on American campuses, are virtually unheard of in Belarus. The introduction of divergent points of view on controversial topics into classroom discussions is also largely absent. In fact, the educational system of Belarus, including all curricula issues, continues to be tightly controlled by the state. Still, the CLD Program's use of Internet technologies has had a powerfully democratizing influence on Belarusian learners who have participated in this project.



Model for Non-Hierarchical Learning

Technology-enabled interactions between students from different cultures and with different expertise and skill sets have presented challenges. For instance, American students display an almost casual approach to e-mail correspondence, often failing to use proper punctuation or sentence structure. By contrast, Belarusians take particular care in constructing well-written messages, exacerbating the time constraints caused by limited computer laboratory access. Mentors in both countries encouraged collaborative techniques for negotiating these barriers to communication.

History professor David Lux noted that crucial pedagogical issues arose during the initial offering of his course, "The History of American Technology." Viewing the course as an experiment to field-test technological and pedagogical issues associated with distance learning, Lux observed that cultural differences significantly affected how students approached the course. Belarusian students "proved voracious in their willingness to digest readings and engage in very sophisticated dialogue about the meaning and content of what they were reading." Yet, Lux concluded that "the collaborative learning, student-project features of the course," so popular with Bryant students, did not initially "translate meaningfully" into the educational culture of Belarus. With guidance and examples from Bryant faculty and students, however, Belarusian students gradually came to appreciate the value of collaborative projects.

In the course, "Cultures and Economies in Transition in the Post Soviet Era," Professors Judy Barrett Litoff and Joseph Ilacqua described a high level of energy by students representing diverse countries. Heated debates often ensued as students tackled the difficult challenge of understanding societies in transition. However, their shared experiences as students helped them to negotiate their diverse perspectives. For example, during the Kosovo crisis in the spring of 1999, spirited e-mail exchanges of conflicting student perspectives took place. These discussions demonstrated the value of exploring cross-cultural and comparative political differences in order to better understand complex global problems.

Belarusian students enrolled in "Environmental Policy: Technology, Business & Government," a course offered by Professor

Gaytha Langlois, lacked a basic understanding of the governmental infrastructure necessary to implement well-designed environmental policy initiatives. Even Bryant students were poorly informed about how policies are actualized in the U.S., but in Belarus, the differences in governmental structure and practices further complicated this problem. The process of acquainting Belarusian students with the roles that government and non-governmental organizations play in crafting environmental and business policy has proved to be more cumbersome than expected. Through the use of structured International Virtual Roundtable Discussions, the ability of government and non-governmental organizations to formulate environmental policies became clearer.

Technical Considerations

Time differences, Internet delays, and the technological realities of Belarus presented challenges that limited the use of complex distance learning technologies. Consequently, we designed a relatively inexpensive and modest program. Since access to the Web in Belarus is often slow and unpredictable, we have provided CD-ROM versions of the CLD Web site to Belarusian students. CD-ROMs that are run on computers connected to the Web provide students with full entry to the CLD courses, including the ability to access hyperlinks. In addition, through the cooperation of information technology specialists at Bryant and EHU, a mirror Web site has been established to enhance connectivity.

Because of the seven-hour time difference between the east coast of the United States and Belarus, and because Belarusian students have limited access to e-mail and depend primarily on under-equipped (by U.S. standards) university computer laboratories for electronic communication, synchronous and asynchronous e-mail communication between the United States and Belarus has proved to be more difficult than we had originally anticipated. U.S. students are routinely assigned personal university e-mail addresses, but as a rule Belarusian students are rarely provided one. Even when students are assigned e-mail addresses, however, they often discover that access to university computer laboratories is limited to 2-3 hours a week. To encourage synchronous e-mail communication with students, Bryant faculty have adopted e-mail office hours between 11:00 A.M. until 1:00 P.M. (6:00 P.M. until 8:00 P.M. in Belarus). By choosing these e-mail office hours, we are able to avoid the busy use of the Internet in Belarus during the mid- and late afternoon.

The most useful and successful distance learning technique that we have introduced is the International Virtual Roundtable Discussion (IVRD) via e-mail. This tool, utilizing the Internet to promote cross-cultural and comparative perspectives, has been incorporated into all CLD courses and has been enthusiastically embraced by learners. The IVRD features structured discussions that avoid the pitfalls of unmoderated chat rooms, yet it encourages learners to share informed opinions about specified topics that often result in lively exchanges of viewpoints.

On occasion, we utilize Microsoft's NetMeeting program to provide live, two-way, global "see and talk" communication over the Internet. The Microsoft NetMeeting program, standard on new computers, uses simple computer accessories, including microphone, speakers, headset, and small video camera, that cost about $100. This inexpensive technology, although dependent upon a relatively new computer (about $1,000), replaces the high costs of long-distance telephone charges and video conferencing. Although two-way video and audio communications are exciting and hold great promise, they frequently require users to have great patience and perseverance in order to make them work properly.

Major Collaborators:

Bryant College: http://web.bryant.edu

Envila College for Women: http://geocities.com/Athens/Agora/9237

European Humanities University: www.ehu.unibel.by

Information Technologies Center, National Academy of Sciences of Belarus: www.bas-net.by

Major Funding Agencies:

U.S. Departments of Defense, Energy, and State Higher Education Support Program, Open Society Institute

Office of the Vice President of Academic Affairs, Bryant College

Global Marketplace of Ideas

The CLD Program was further expanded in the spring of 2000, when Bryant was awarded the first of a series of U.S. Department of State Community Connections Program Grants (see http://web.bryant.edu/~comconex). These grants have enabled entrepreneurs from Belarus and Ukraine to participate in seminars and classes at Bryant, collaborate with Rhode Island businesses as interns, and meet with community leaders. The 40 participants from Belarus and Ukraine who have completed this program have provided us with a more realistic perspective about the challenges of conducting business in transition economies.

The CLD alliance of Bryant College with academic, business, and research institutions in Belarus demonstrates that Internet-based, collaborative learning across international boundaries, even with significantly different technological environments and requirements, can be achieved and supported by relatively inexpensive information technologies. Underlying all the projects associated with the CLD Program is a commitment to collaborative approaches to problem solving and decision making that make regular use of cross-cultural and comparative analyses. The Bryant/Belarus CLD Program has also shown that Internet-enhanced courses and training programs that focus on collaborative learning provide practical opportunities for academic, business, and research decision makers from the NIS to better navigate the global marketplace of ideas.

__Gaytha A. Langlois__ is professor of Environmental Policy in the Department of Science and Technology, __Judy Barrett Litoff__ is professor of History in the Department of History/Social Sciences, and __Joseph A. Ilacqua__ is professor of Economics in the Department of Economics, all of Bryant College, Rhode Island. langlois@bryant.edu, jlitoff@bryant.edu, and jiliacqua@bryant.edu

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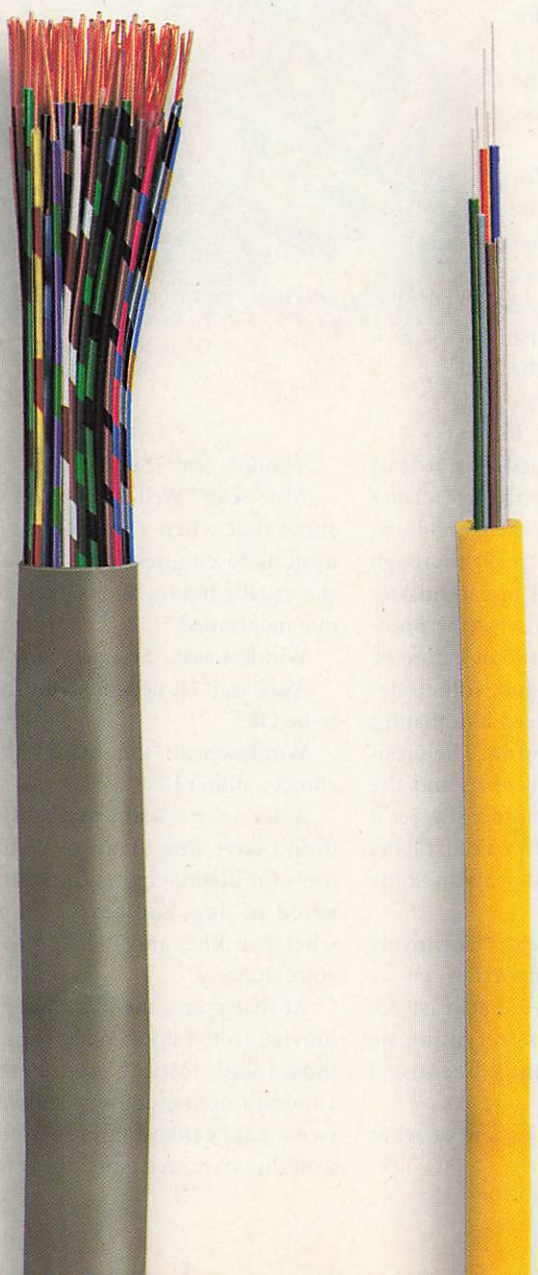

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Sally M. Johnstone

As founding director of the Western Cooperative for Educational Telecommunications (WCET) at the Western Interstate Commission for Higher Education (WICHE), Sally Johnstone serves as a resource on higher education technology issues. She also serves on the Board of the American Association of Higher Education, the U.S. Open University's Board of Governors, and the Advisory Panel for the Consortium for the Advancement of Private Higher Education. sjohnstone@wiche.edu

Decision Support for Distance Learning Solutions: Help is Online

A few weeks ago I attended a conference where, as with many of the conferences I attend, people from different colleges and universities were trying to discover the best solutions for their institutions as they move their distance learning activities onto the Web. When the sessions ended for the day, I rode back to my hotel on a bus and began listening to the conversations going on around me. This is what I heard:

Conference attendee in window seat: " ... so my president asked me for a list of the companies that could provide the services we needed. I used the Web and everyone I knew to get that list together. I wrote descriptions of the services each one offered, and estimated what our costs were likely to be, given what we actually needed—or at least what I thought we needed after the last dean's council meeting. I wrote up this extensive document and gave it to him. It was a really thorough and good report. He promised me an answer within a week. But, do you know what the president did? On the Thursday afternoon before he was supposed to make his decision, some sales guy came to his office and convinced him that his was the best company to do the work. The president never even looked at my report, and the company he chose is one of the most costly, yet it can only do three-fourths of what we need. I'll bet that salesman offered him good seats to some exotic event to clinch the deal!"

Conference attendee in aisle seat: "How many companies did you put in your report?"

Window seat: "Well, there were at least 23. Not all of them could really do everything we needed, but I included so many because I wanted to do a thorough job."

Aisle seat: "Do you want my view of what went on?"

Window seat: "Sure."

Aisle seat: "Well, studies on decision making show that when you give someone too many options to choose from, plus a deadline, he or she usually freezes and is likely to choose the last one mentioned."

Window seat: "So how many is too many?"

Aisle seat: "It depends, but three to five seems to be OK."

Window seat: "Oh, man, I blew it with the 23 choices, didn't I?"

Aisle seat: "Yeah, probably. Too bad you didn't have one of those Web-based decision tools for buying digital cameras or picking out a breed of dog. You are asked questions about what you like, and it helps you narrow down your choices."

At that point, the bus came to my stop and I hurried to the door. What should I have said to those folks? I wish I had told them about Bruce Landon's online delivery software decision tool (www.c2t2.ca/landonline). Well, they probably wouldn't have welcomed the intrusion.

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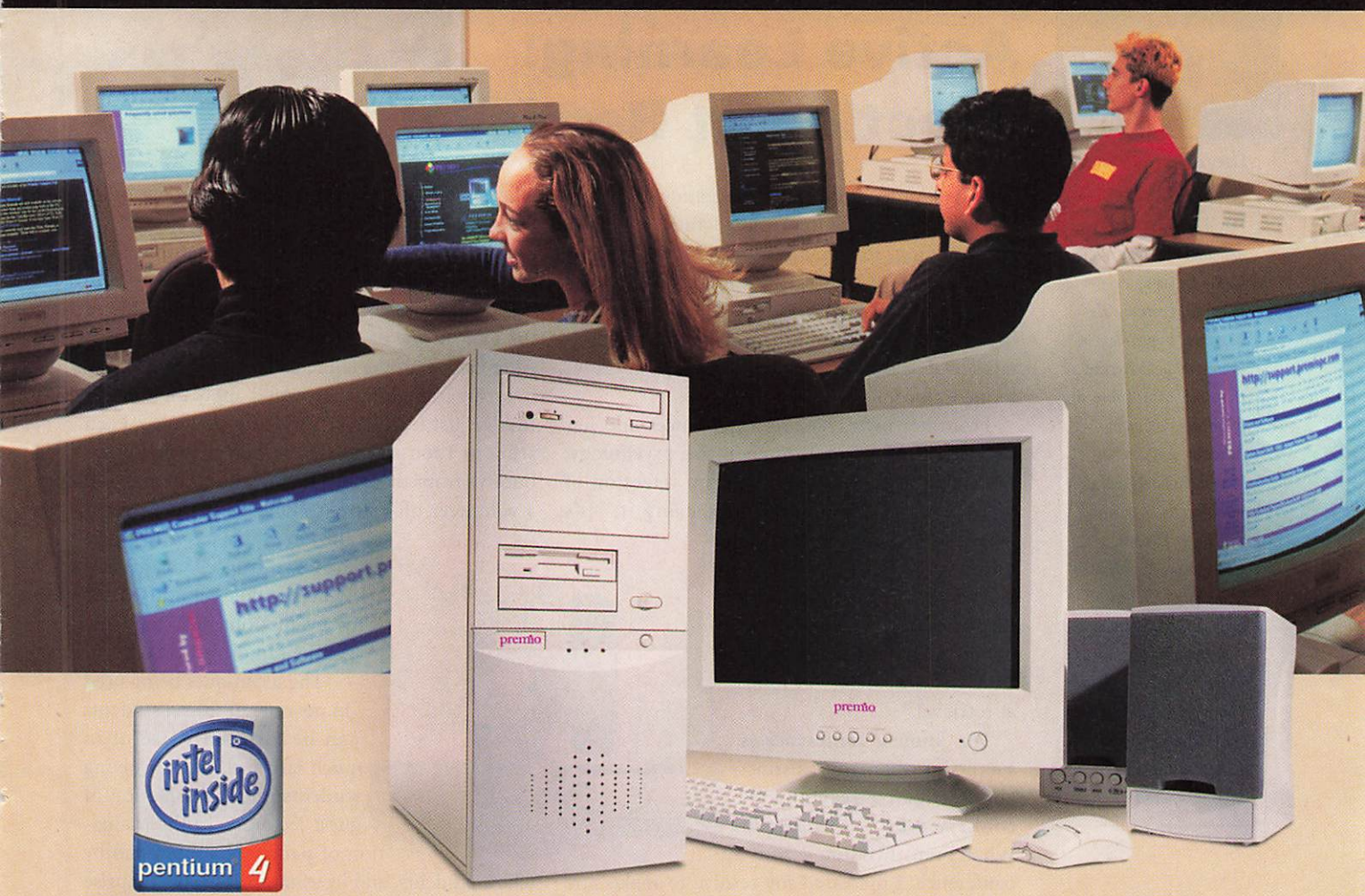

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David G. Brown

David Brown is vice president and dean of the International Center for Computer Enhanced Learning. He has served as president of Transylvania University, chancellor of the University of North Carolina at Asheville, and chair of several national groups, including the AAHE and the Higher Education Colloquium. As provost of Wake Forest University, he founded the Annual Conference of Ubiquitous Computing Colleges and Universities, and founded the Journal of Computer Enhanced Learning.
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Active Learning: Practice at Retrieval

Last summer at the 26th International Conference on Improving College and University Teaching, in Johannesburg, South Africa, I was honored to share keynoting responsibilities with Nelson Mandela. One of the conference's best sessions was led by Diane Halpern, a psychologist from Claremont McKenna College in Claremont, California.

From her own teaching experiences and her knowledge of research in cognitive psychology, Dr. Halpern argues that long-term retention of knowledge is dependent upon using it. "It's what the learners do that determines what and how much is learned.... The single most important variable in promoting long-term retention and transfer is practice at retrieval."

You know a conference is successful when your instincts about effective teaching are confirmed by solid research. When I returned home from the conference, I increased my resolve to make sure my students get even more "practice at retrieval." In addition to a few low-tech changes in my teaching (such as team projects in class; more class discussion, especially relating contemporary events with economic concepts; and teams of students working in advance with guest lecturers to increase linkages between the lecturers' "war stories" and our ideas), we were able to increase the quality, quantity, and convenience of "practice at retrieval" using our computers and the Internet.

Immediately after reading the assigned chapter in our textbook, my students are e-mailing me their "muddiest point." Students are getting practice at retrieval, and I'm reshaping plans for tomorrow's class on the basis of their just-in-time feedback.

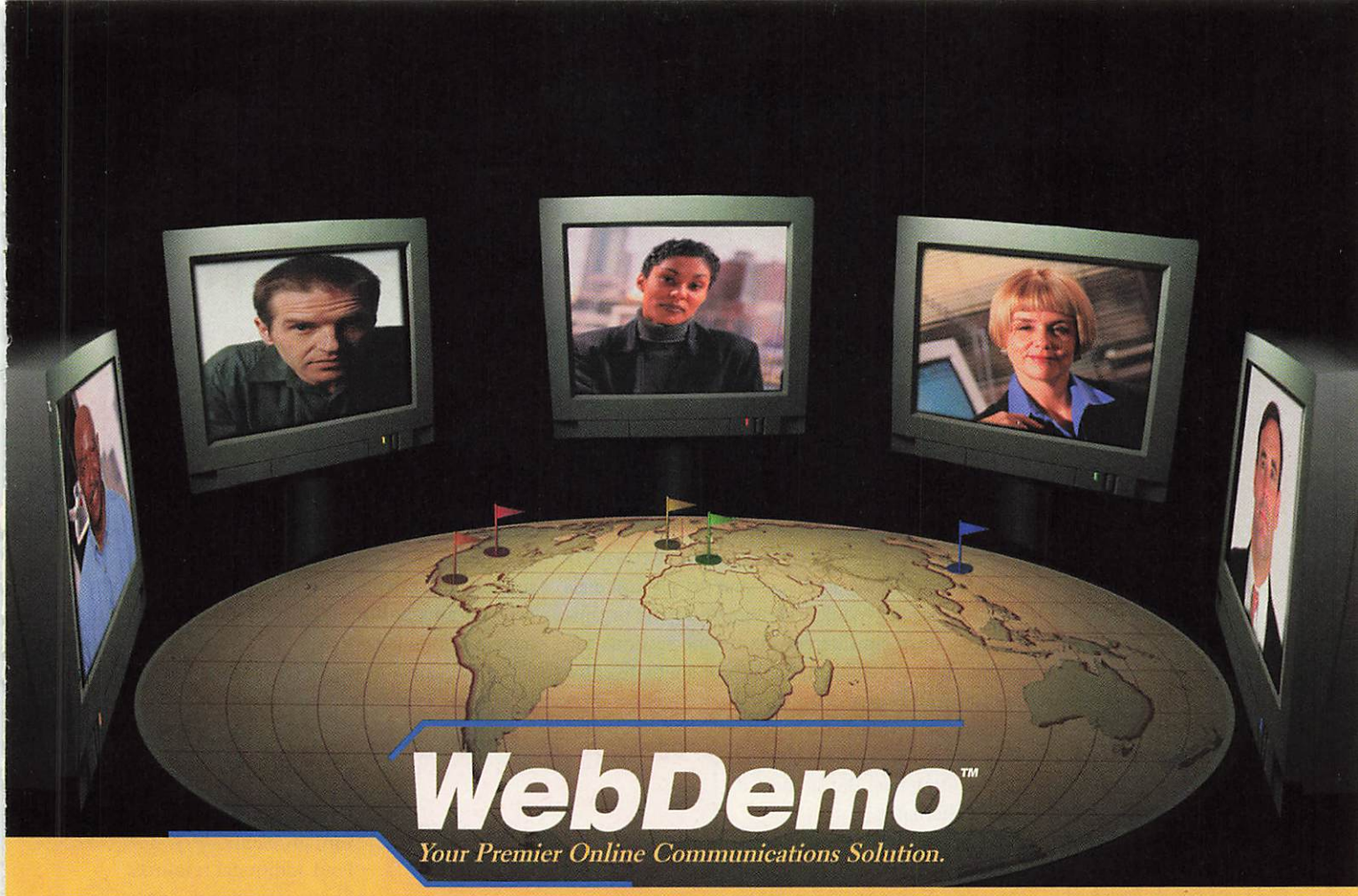
In an electronic chat session with the entire class, students share a one-sentence summary of the most important concept in the lecture. These restatements provide rich opportunities for a classroom discussion that starts from where students are, rather than from my more extensive knowledge base.

After lecture, feedback, and discussion, I ask students to break out into small teams and develop PowerPoint presentations on how they would use the topic of the day to solve an assigned problem. After class, half the students are asked to describe in a paragraph how they would apply the concept they've just learned to a specific challenge. Each student then shares his or her answer with a buddy (from the other half of the students) and a volunteer off-campus alum. Over the Internet the three discuss and agree upon a single paragraph, which is then submitted for my evaluation. Both students get the same grade.

The techniques being used in my class of fifteen students can be especially useful in much larger classes. Involving students in the orientation of guest lecturers, in the evaluation of paragraphs submitted by fellow students, and in team projects all comprise the active learning process.

Throughout our teaching I believe we need to keep students retrieving and re-retrieving, then applying the concept. Dr. Halpern suggests that we regularly ask students to answer thought-provoking questions such as, What is an example of the concept of the day? How could your newly acquired knowledge be used to create something new? What are the implications of a particular idea? When time and small enrollments allow, these questions can be addressed to each student during class. Students can also benefit greatly from reflecting upon their own answers and discussing the issue with other students.

To paraphrase Nelson Mandela, "...in the end, the only important thing in life is having a positive and lasting effect on someone's life." We can hope that many professors, using the computer and the Internet, will redesign their courses to students' "practice at retrieval" and, consequently, exert a longer-lasting influence on each student's life.



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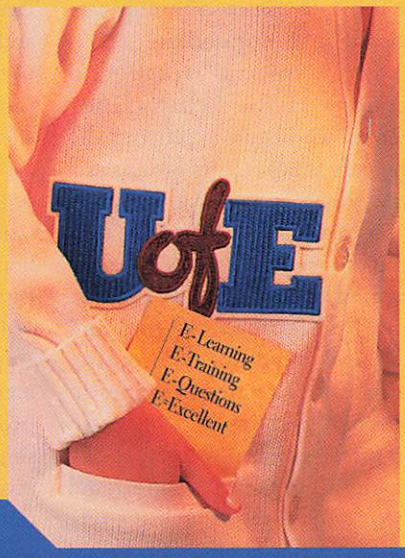

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Steven W. Gilbert

Steven Gilbert joined the American Association for Higher Education (AAHE) as Director, Technology Projects, in July 1993. He founded the TLT Group as the Teaching, Learning, and Technology Affiliate of AAHE in January 1998. He was previously vice president of EDUCOM, where he created and led the Educational Uses of Information Technology (EUIT) program and the EDUCOM Software Initiative (ESI). He also moderates the Internet listserv AAHESGIT.
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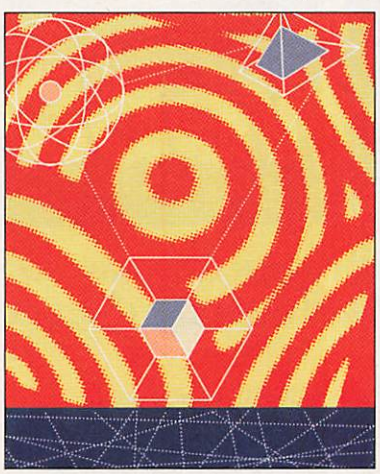
Coaching Partnerships for Professional Development

At many campuses, support professionals have been offering "house calls," one-to-one tutorials when and where faculty find such help most convenient—primarily in their offices. This approach is effective, but extremely demanding on the academic support professionals and the faculty. While technology support organizations once considered one-to-one sessions too expensive or inefficient, the lack of alternatives for reaching faculty who don't attend scheduled workshops has made individual sessions more attractive. But is there a third alternative?



Can we develop programs that foster the establishment of very small groups of faculty to help each other progress toward using education technology—programs that engage faculty through small steps, such as using e-mail to communicate with students? Many faculty members do not feel as if they are accepting a major challenge or new commitment when they begin to use to communicate course-related information to their students.

Beginning with a special track and team/group sessions at the Syllabus2001 summer conference, we began exploring the idea of developing very small faculty groups as a means to extending the reach and cost-effectiveness of support services already stretched thin by workshops and tutorials. The idea is quite simple: TLT Coaching Partnerships that enable faculty and support professionals to find and help each other and develop an ongoing curriculum or program of related activities to sustain the progress of the groups.

One of the top priorities when forming a TLT Coaching Partnership is the group's comfort and willingness to work together. Sharing some common instructional goals is also helpful. Such a partnership may begin as a group of two or three people brought together by a commitment to "coach" each other to make progress on a specific issue related to improving teaching and learning with technology. Some partnerships include only people from the same institution, while others include people from different institutions. The work of TLT Coaching Partnerships may also support and extend the activities of larger groups or programs within a college or university—or inter-institutionally.

Participants in each TLT Coaching Partnership help each other to:

- Better understand their common challenges and issues
- Find better solutions to relevant problems
- Find additional resources
- Share the load—provide encouragement, ideas, sympathy, and alternatives.

Each institution needs to develop its own guidelines, schedules, external reminders, communications vehicles, training, and other resources and services to sustain the progress of TLT Coaching Partnerships on campus. Watch for sample materials and further development of these guidelines at *www.tltgroup.org*. I'm especially interested in what you have already been learning from making similar efforts. Have some of the experts in collaborative and cooperative learning been applying their ideas to professional development? What are they finding? Can the Web and other new applications of information technology be used to support TLT Coaching Partnerships and similar efforts?

In the long run, the accumulation of small steps can result in major change. Faculty members who become comfortable using word processing, e-mail with students, and some simple Web tools to make course materials more accessible often discover that they have begun to think differently about their teaching. They begin to raise questions and to consider alternative teaching approaches that never occurred to them before. These small steps lay the foundation for major change in approach and direction.

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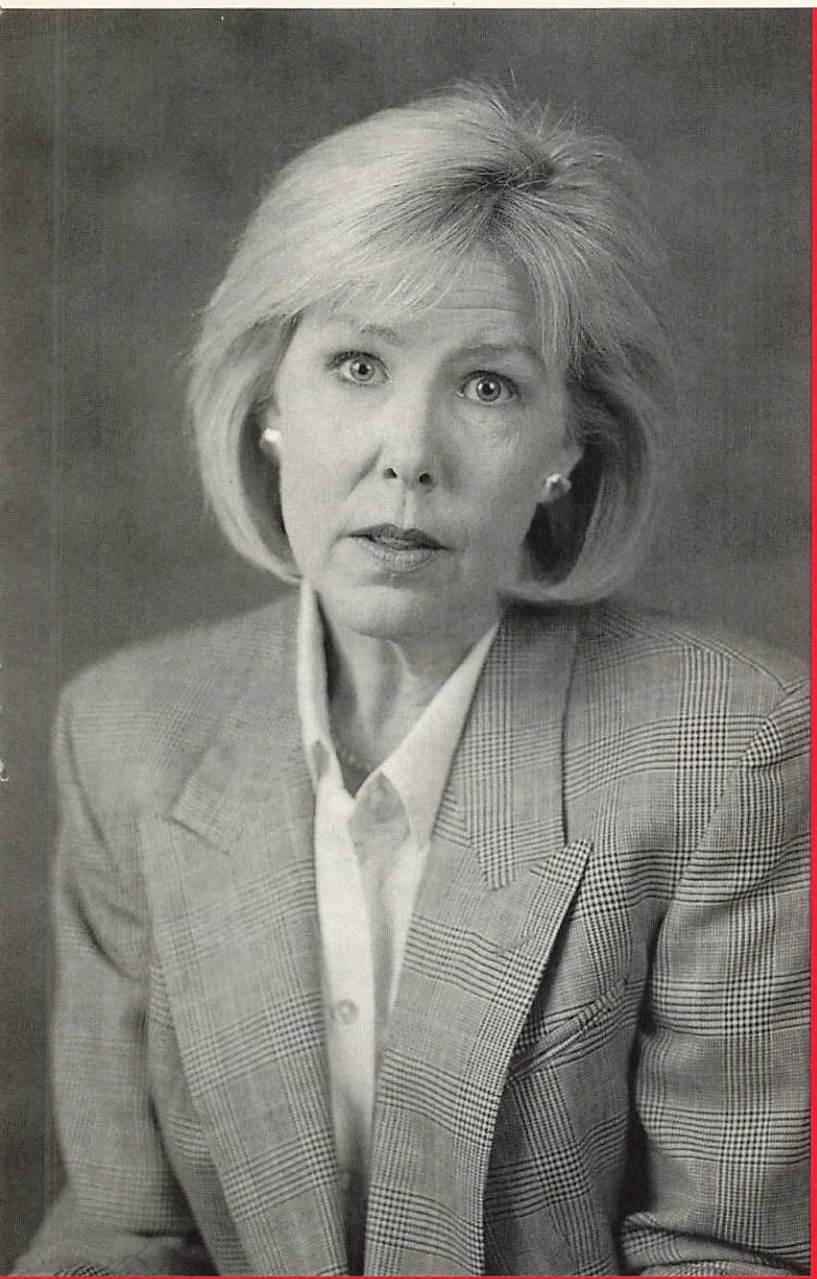

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Content Areas and Tracks

In eight tracks, we examine the central themes and key technologies which have become increasingly important to diverse constituent groups in higher education as they move forward with strategic technology planning and innovation.

Track (1) New Technologies Update:

A look at current and emerging technologies and their applications in higher education environments.

- Handheld devices and PDAs
- Advanced networking applications and the Next Generation Internet
- Internet2 update
- E-books
- Laptops programs on campus
- Smart buildings and classrooms
- High-end video applications
- Visualization, 3D modeling, and virtual reality applications
- Quantitative and statistical tools update
- Trends in personal computing and communication devices
- Wireless applications in education
- New distributed computing applications in education

Track (2) Administrative Systems for the Academic Enterprise:

A track designed especially for those charged with the operation of campus-wide administrative systems.

- Student administration systems
- EDI in the registrar, admissions, and records offices
- Smart card systems on campus
- Portals for admissions and alumni communications

Track (3) Technology Infrastructure and IT Planning Issues:

Faculty, IT, and administrators plan together for change and maintenance of technology programs on campus.

- Change management and IT planning
- Interactive communications infrastructure
- Network architecture for scalability and reliability
- Campus portals
- Distance education programs and technology directions
- Professional development and faculty support
- Going the distance: reaching new student populations
- Legacy systems, entrenched technologies, departmental interests, and technology selection policies
- Online DL programs and collaboration technologies
- Scalable models for distance and distributed learning
- "The other infrastructure:" planning for technology on campus
- The globalization of .edu: policies and practices

Track (4) Standards, Interoperability, and Open Source:

Standards, implemented on a broad scale among higher education institutions, pave the way for resource sharing as well as improved workflow. Will open source development flourish in academic environments?

- Open source strategies
- XML: the evolution of markup standards
- IMS update
- Image and metadata standards
- Web search engines and finding tools
- Visual data description, storage, and retrieval
- Peer-to-peer networking strategies
- LINUX in the campus community
- Security for campus environments
- Secure access to resources with PKI/digital certificates
- Accessibility issues and universal design

Track (5) New Publishing Models and Intellectual Property:

Individual and institutional concerns for digital rights, resource management, and autheniticity as new publishing models develop.

- Web publishing for the academy
- Intellectual property rights for faculty
- Digital rights management on campus
- Content management systems for .edu
- Digital libraries: resource aggregation/distributed collections
- Data permanence: choosing the right technology
- Authentication of digital resources

Track (6) Web-Based Environments for Teaching and Administration:

An examination of technology trends, pedagogical implications, and administrative applications in Web-based or Web-enabled campus environments.

- Web course development tools and Web-enhanced teaching environments
- Web-based learning management systems/course management systems
- Instructional design for Web-based courses
- Web-based content resources in education
- Interactive and streaming media
- Staffing, hardware and software requirements, and long-term planning for Web-based programs
- Dynamic Web updating
- Back-end databases
- Managing course size on the Web: success criteria

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Syllabus

Track (7) Evaluation and Assessment Strategies:

Student assessment and technology program evaluation are considered in this track, along with the question of why new assessment and evaluation strategies may be needed to accompany technology innovation on campus.

- Technology program evaluation standards
- Automated feedback to students
- Security issues and online testing
- Accreditation and online learning programs
- Student assessment practices for the wholly online program
- Formative and summative evaluation strategies

Track (8) Faculty Innovation—Case Studies:

An opportunity for faculty to share their successes in using technology for teaching and course administration.

- Showcase of teaching with technology: lessons learned
- Adoption success stories: "real world" implementations of new technology
- Cutting-edge technology and pedagogy
- Collaboration among students and faculty using Web/Internet technologies
- Curriculum redesign and lifecycling examples
- Student perspectives of Web courses and online programs

Pre-Conference Workshops and Seminars

In addition to presenters for the main conference program, we are seeking individuals to lead full- or half-day workshops or seminars for the pre-conference program. The workshops, held in computer labs, provide hands-on learning with specific technologies such as the Web or multimedia; seminars are classroom-style presentations, not held in computer labs, that explore important topics in the application of education technologies. Seminars are especially sought.

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Please note: As a condition of acceptance, each presenter will be required to submit, by March 15, 2002, a 1,000- to 1,500-word article for consideration for publication in the conference proceedings, in *Syllabus* magazine, or on SyllabusWeb.

Submission Guidelines

The submission form will ask for the following information:

- The title of the presentation, to be used in the conference program
- An abstract of the presentation content (600 words or less)
- An indication of the conference track(s) into which your topic would most likely fall
- The proposed format
- Presenter bio (one 80-word paragraph)
- Brief description of the presentation for the conference program (one 100-word paragraph)
- Complete contact information for each presenter or co-presenter named
- Any further information that might be helpful in determining the relevance of your topic to the conference themes

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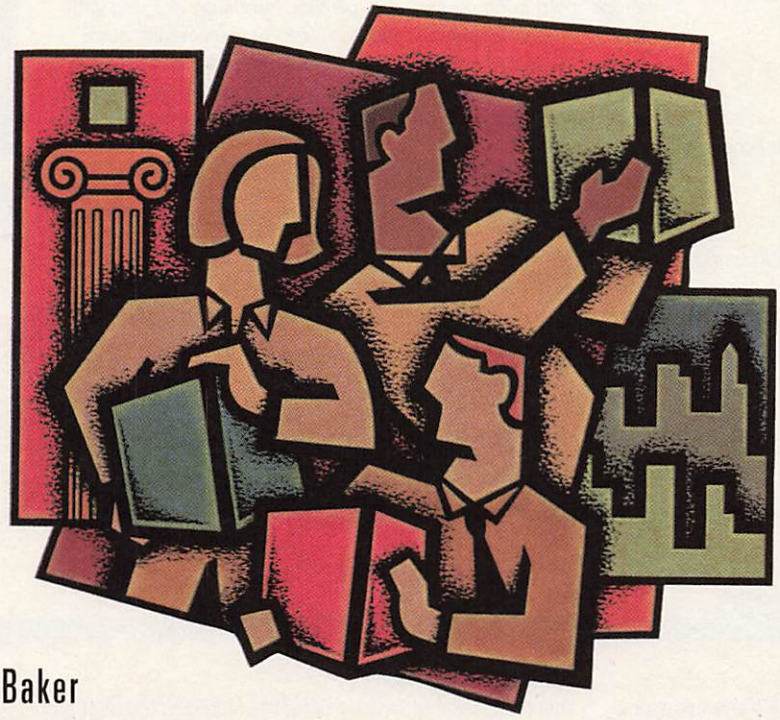
Enhancing Online Faculty Productivity with WebCT



The San Diego Community College District created a successful training program for development of online courses using WebCT. Here, the dean of the program provides insights into efficient design, delivery, and assessment of online instruction.

Judy Baker

SAN DIEGO COMMUNITY COLLEGE DISTRICT

Experienced online instructors can easily identify the most time-consuming tasks in course development, management, and delivery: course organization, the conversion of course materials for online delivery, student assessment, and interactive features. While at many colleges internal grants provide the incentive for faculty development of online courses, the sustainability of online instruction programs demands efficient use of faculty resources—strategies for the appropriate use of online course management systems.

At San Diego Community College District, instructors receive formal training in instructional design and strategic use of WebCT prior to teaching their first online course. WebCT's many features for course organization, communications, and testing make it both a complex software program as well as a highly scalable solution for the delivery of online instruction.

Course Organization

First, for a multiple-section course, instructors need to decide whether to include students from all sections in the same course, or whether to create duplicate courses for each section. If no changes will be made to the course materials, the latter approach will work. But if the course is dynamic and evolving throughout the semester, the former works best. One way to manage a single course containing students from multiple sections using WebCT is to include, as a common component, course materials accessible to students in each section. Instructors can then develop customized discussion topics and tests for each section. The instructor can limit students' access to portions of the course by utilizing the Selective-Release function of WebCT. By designating a hyperlink on WebCT course Organizer Page for Selective Release, the instructor can control when and to whom the hyperlink will appear based on students' first name, last name, User ID, student records from Manage Students, and date.

Second, students are more successful and efficient when given limited navigational options. By providing clear and meaningful navigation throughout an online course, the instructor minimizes student communications devoted to technical and logistical questions rather than course content. Course developers have the option to remove or minimize navigation features on the Course Menu, Homepage, Action Menu, and Content Module Table of Contents, but not on Breadcrumbs and Course Map.

Illustration by Christopher Baldwin

Students can link to specific areas of course content by selecting items from the Table of Contents of a Content Module. In WebCT, Content Modules provide an efficient way to organize course material. Course content can be organized into a Table of Contents that provides a sequential list of each course component. Each item listed in the Table of Contents is actually a hyperlink for students to click for quick access to text, multimedia, and HTML files.

Another efficient use of student and faculty time is to provide opportunities for students to demonstrate competency/mastery so that they can skip lessons and progress through the online course at a pace that is appropriate for them, thereby avoiding unnecessary student work and teacher grading. The Selective Release feature of WebCT allows the instructor to control access to selected portions of a course based on individual student performance.

Conversion to Online Delivery

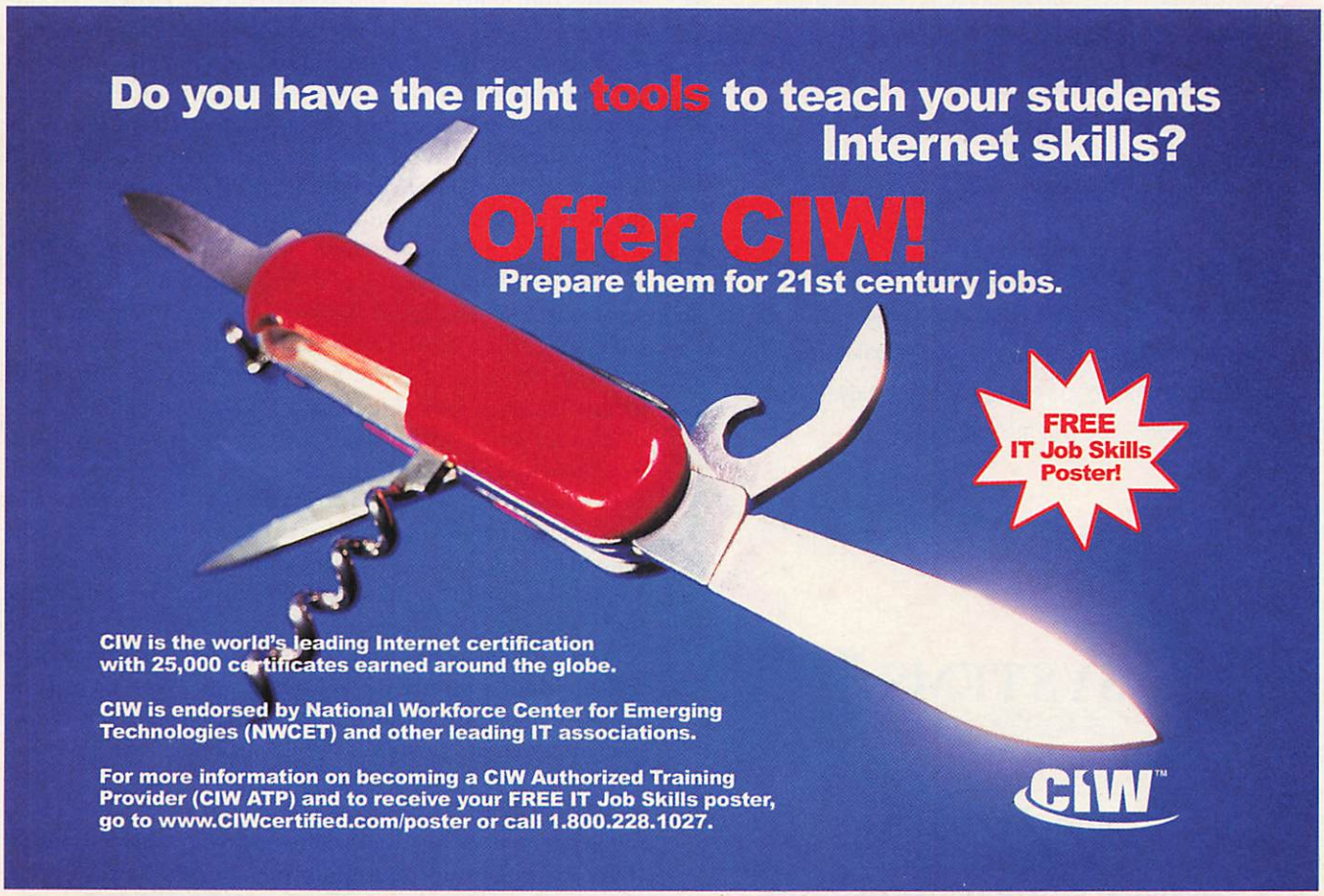
Many instructors find that the process of converting existing documents for use in a WebCT course is tedious at best, and daunting at worst. First, all course materials need to be put into digital format such as word processor text, HTML, or PDF files.

Next, the instructor must upload the files into the WebCT course using File Manager. Some instructors speed up this process by combining all course-related materials into a single zipped file, compressed to take up less storage space and upload to WebCT more quickly.

Unfortunately, the use of files other than HTML or simple text in WebCT can create problems for students who do not have access to the plug-in software necessary to view the files. To circumvent this problem, instructors can include links to free downloads of the required software or plug-ins from the WebCT course Web site or a companion CD-ROM.

Many HTML editors, such as Dreamweaver and FrontPage, aid in the process of converting existing course materials into HTML or Web page format. But each editor requires time and training. Another option is to save and/or export documents into HTML format using tools found in most word processing programs. However, creation of an HTML document in Office 2000 adds special markup tags to the document that are problematic in WebCT. To avoid difficulties, instructors can install Microsoft Office 2000 HTML Filter when converting Word 2000 or Excel 2000 documents. Users can open the document to be filtered, then use the Export to HTML command on the File menu.

Finally, the Exchange zones of the WebCT Web site at www.webct.com/exchange/ provide several tools for converting existing materials into a WebCT course. For example, the WebCT Calendar Tool Text File Creator allows instructors to create a text file for uploading and importing to the Calendar Tool within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WebCT. With this tool, the instructor can make a list of all desired calendar entries offline, then add them automatically and simultaneously to the WebCT Calendar. This is far less time-consuming than making individual calendar entries by typing information into various fields within the WebCT Calendar area.

Online Student Assessment

Successful online instruction demands frequent and varied student assessment, but assessing online students poses unique challenges. For instance, the need for more assessment requires alternative grading strategies, such as randomly selecting 50 percent of student submissions for detailed grading and comment. Another approach is to employ self-grading and peer grading. In addition, assessments that do not count toward the final course grade can provide feedback on student performance with less pressure on both instructor and students.

In courses delivered via WebCT, the Track Students tool, as well as the Search feature in Discussion Board and e-mail postings, provides ample information about the activities of individual students. In the Manage Students area, the Track Students tool gives instructors details about the progress of individual students through the course material. The instructor can obtain a listing of the pages in the content modules that students have visited and the date and order in which students visited each page. The instructor can also access a report on the number of times each student viewed and/or contributed to a Discussion posting. WebCT tracking tools can also be used to identify and diagnose student participation patterns for early intervention. For example, instructors can track the number of e-mails and/or bulletin board messages generated by individual students from the Track Students report, then sample these messages using the Search feature in Discussion to gauge the quality of their work and the thoughtfulness of their discussions.

To build a Question Database for creating tests while within WebCT, instructors must enter each question into the database separately. The process can be very time-consuming and has a high potential for error. Fortunately, instructors can create test questions outside of WebCT by following a specific set of formatting rules. Several tools exist for automating the process of converting existing tests offline for use in WebCT: Respondus, MakeQuiz, Quiz Parser, and Question Assistant. Each allows the instructor to create a test as a word processing document, formatting the questions so that they can be uploaded and imported to the Question Database within WebCT. Respondus is the most powerful and versatile of the tools. Quiz Parser, MakeQuiz, and Question Assistant can convert multiple choice and true-false questions from simple text files into a format for uploading into WebCT Question Database. Questions created using Question Assistant can be used on a Web site outside of WebCT for student self-review.

Interactivity

Innovative approaches to providing instructor-student interactivity are key to decreasing online course attrition rates. However, unless instructors set parameters for these interactions,

the 24-hour/7-days-a-week expectations and assumptions of students can become overwhelming. Instructors might consider the benefits of organizing students into small groups for the purpose of coordinating their communications with the instructor and each other.

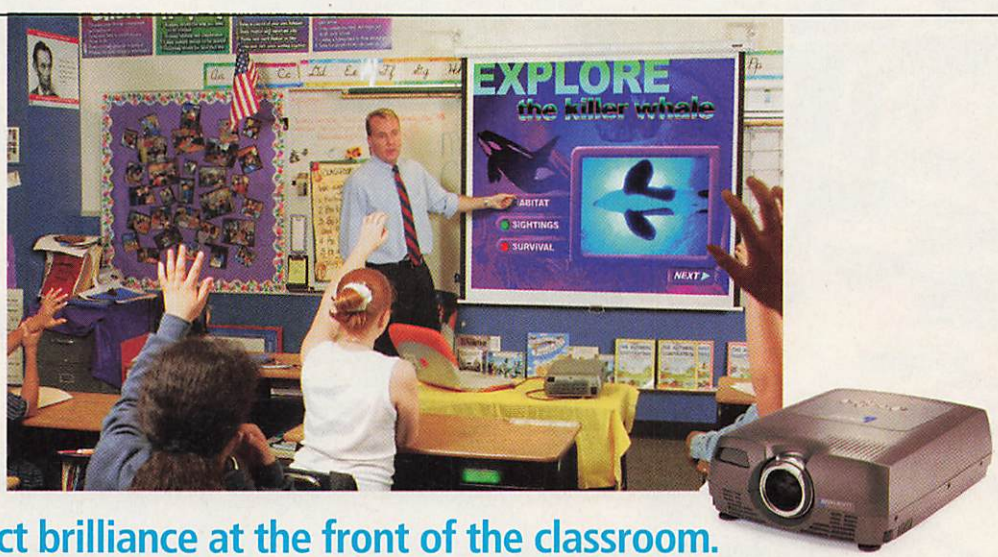
The Student Presentation tool under Manage Course in WebCT has a Group Generator for forming groups from the class list either manually or randomly, allowing e-mail to be delivered to all members of each group rather than to individual students. In the Discussions area of WebCT students and instructors can send, read, and search for messages. Using Topic Manager, the instructor can create discussion groups under private topics available only to the set of students selected by the instructor.

The designation of a group spokesperson will dramatically reduce the number of student-to-instructor interactions. The instructor can also lock a Discussion topic so that messages can still be read but no new messages can be posted. Because messages posted in the Discussions areas can be compiled and downloaded by students, students can communicate with each other about their questions to refine and consolidate their questions. Knowing that interactions with their instructor are limited, students may be motivated to enhance the quality and nature of their communications. In addition, instructors can assign students to summarize online group Discussions postings on a rotating basis every week. Instructors could also consider assigning different students each week to post a summary of the class discussion for the prior week, or respond to frequently asked questions in the Discussions area.

Challenge to Educators

Online course development and delivery need no longer be the exclusive responsibility of the instructor. At San Diego Community College District this past year, a team approach led to the development of SDCCD Online. The team of more than 50 faculty and staff volunteers from Miramar College, City College, Mesa College, and the Centers for Education and Technology coordinated faculty development, student support services, course development, and technical services for delivery of fully online instruction via WebCT. As a result, SDCCD Online now offers a fully online Associate in Arts degree in transfer studies and a Webmaster Certificate along with an online student services infrastructure, including online application, registration, library, counseling, bookstore, and tutoring. Clearly, effective and efficient online course development and management requires the coordinated efforts of instructors, students, and instructional technology consultants.

Judy Baker *is dean of the San Diego Community College District Online.*
Jubaker@sdccd.net3



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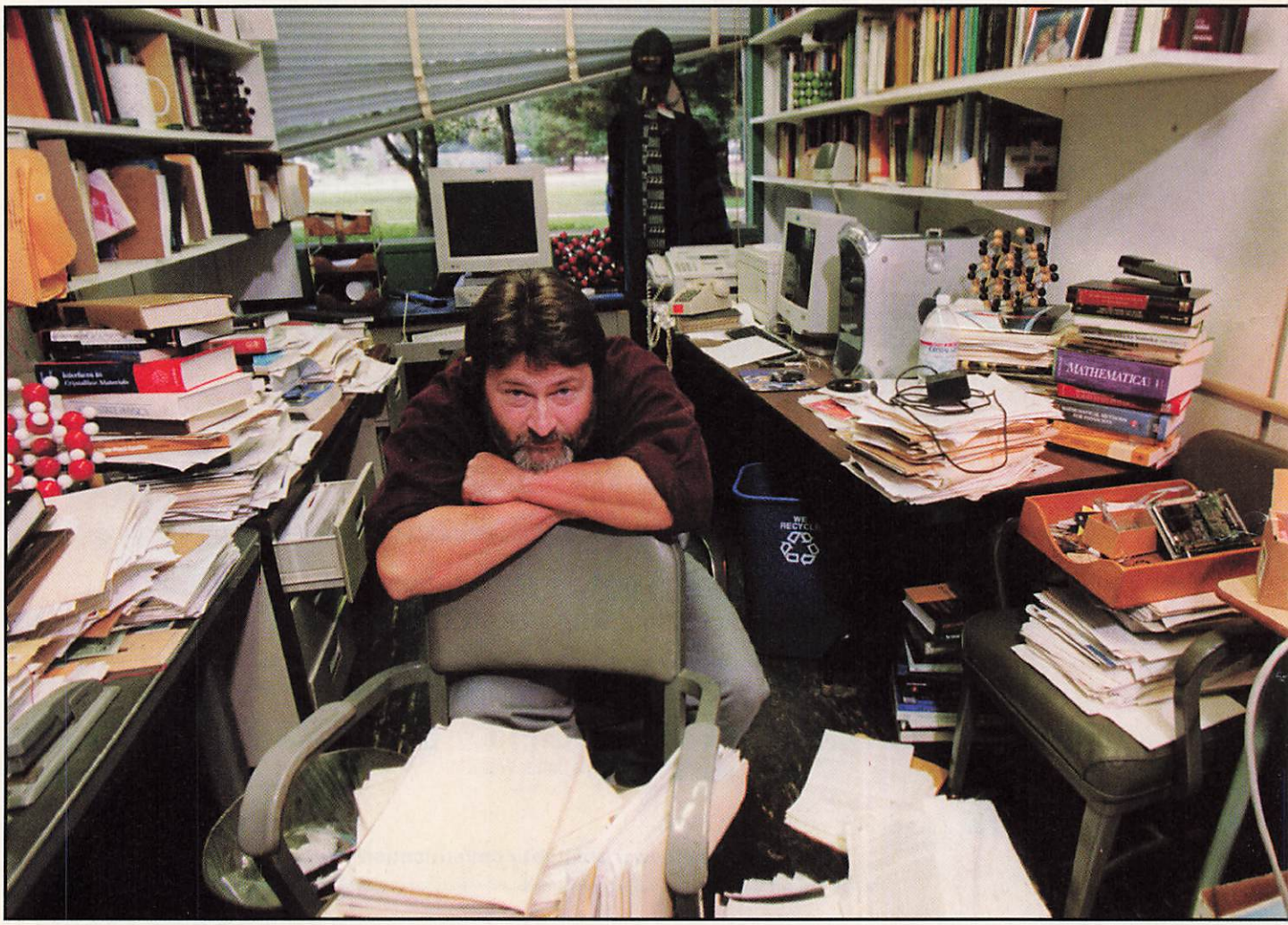
Disordered Array

The Art of Controlling Chaos

In the universe of an academic's office, where projects in various stages of discompletion randomly occupy space, an uncertainty principle seems to reign: the neater the office, the less productive; the more productive, the messier the office.



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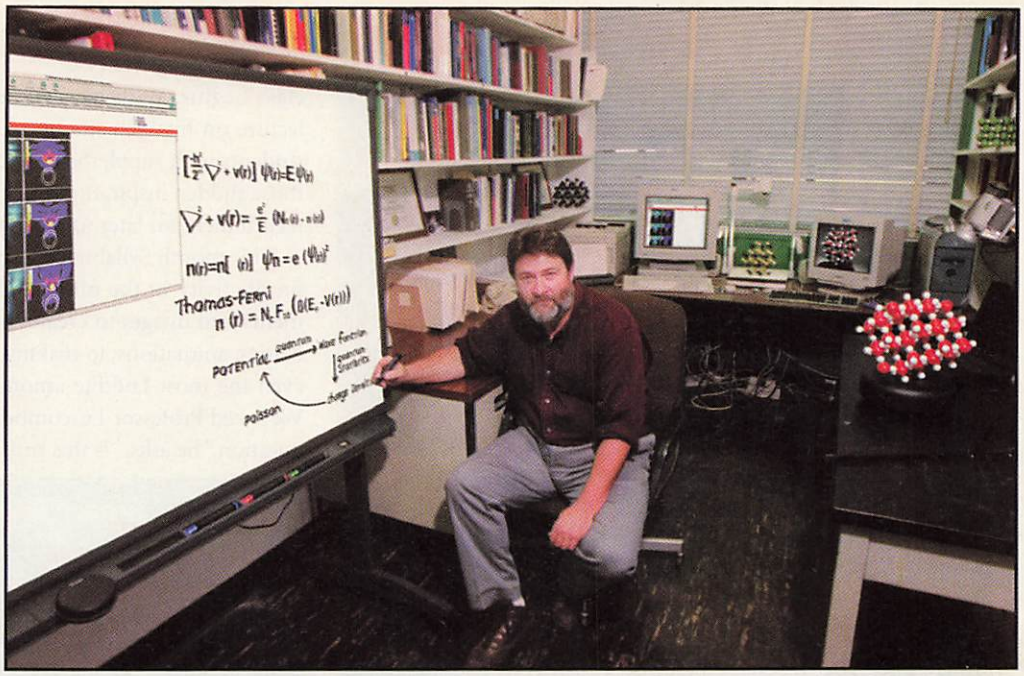


Like many academics, Professor James Luscombe lives a life overrun by exams to grade, dissertations to read, committee recommendations to write, research to conduct, students to see, lectures to deliver. It all creates mounds of paper, floppy disks, extra furniture, boxes of unknown origin, and a collection of books to rival Amazon.com. But beneath the chaos, the professor is a productivity machine, and with so much to produce, who has time to get organized?

"If you're a messy office person," says Professor Luscombe, "you think that cleaning your office comes at the expense of other things. To be both neat and productive is rare."

As he surveys his lair of lawless confusion he adds, "I'd like to think there is a neatness/productivity uncertainty principle at work in nature."

Along with teaching quantum, solid-state, statistical, and electromagnetic physics at the Naval Postgraduate School in Monterey, California, Professor Luscombe is responsible for course development, thesis supervision, and condensed matter physics research—and he serves on a handful of department committees as well as the academic council, a dean search committee, and several Ph.D. committees. The paperwork tends to stack up.

"When I first came here," he recalls, "this office was already a mess. I asked the department chair to have someone come in to clean it up. He handed me the broom." Thus began seven years of entropy: Among piles of books and papers are the abandoned possessions of his predecessor (including a 1960s-era turquoise table lamp and a nonfunctioning electric teapot), discordant computer parts, a box of colored chalk, scattered printouts from Google searches and poetry Web sites, a worn copy of the *I-Ching*, and early snapshots of Luscombe's two children. The office's only modern technologies are his Apple G4 and Sun SPARC 20. The G4 just recently replaced an old PowerPC 6100; still waiting for setup in a corner collecting dust is an aging Sun Ultra 1.

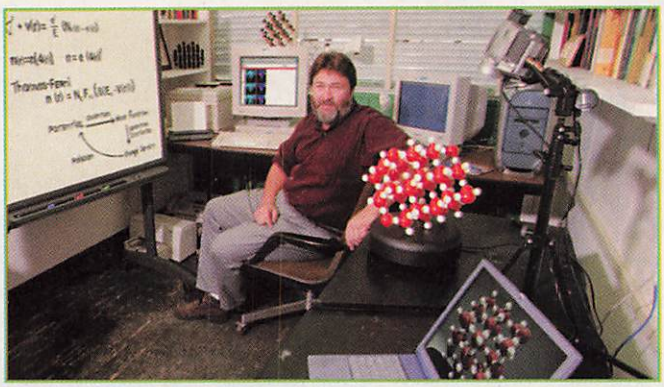
Despite the fact that Professor Luscombe taught a distance learning course on classical mechanics last winter quarter, his *de rigueur* teaching mode is the standard lecture using a no-tech whiteboard. He would prefer a chalkboard. He doesn't use PowerPoint presentations or animated simulations, doesn't post lecture notes or course syllabi on the Internet, doesn't own a laptop, PDA, or cell phone. But his passion for physics and penchant for analogy earned Professor Luscombe Outstanding Instructional Performance in 1997, and in an annual campus-wide survey, students consistently rank him in the top 5 percent of faculty for teaching.

Luscombe is living proof that you don't need technology to be a good teacher and a productive academic. But can you convince a dyed-in-the-wool technophobe that—with a few choice technology tools—he could be even more productive than he already is? *Syllabus* paid a visit to Professor Luscombe's office to find out. We began by firing up the G4 and setting up a personal Web site for his fall semester courses on electromagnetic waves. He posted his syllabi, created links to favorite physics Web sites, and—using Update Computer Services' HTML2EXE 2.2—we showed Dr. Luscombe how to capture key pages from his Web site, organize them into unit lessons, and publish them into an e-book for students to download onto their desktops, laptops, or PDAs. Using an Elmo HV 3000 document camera and a Visioneer Strobe Pro, he scanned lecture notes and still images of 3D models into his computer to be posted on the Web site. And with the Canon Optura DV camcorder and the Kaidan 3D Imaging Kit, we created animations of rotating 3D models and demonstrations of physics simulations.

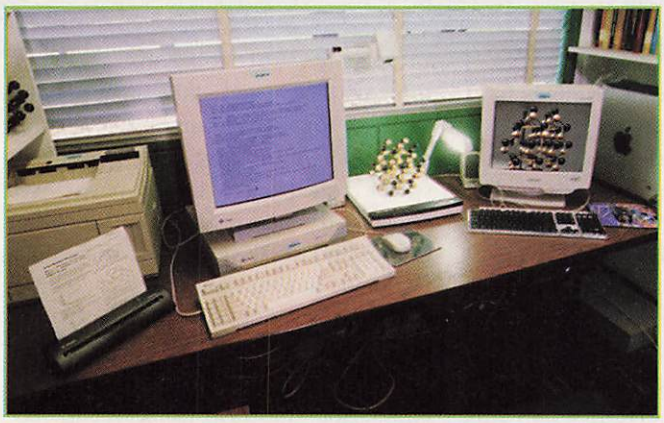
When students come into the office with a question, Professor Luscombe often uses the whiteboard in his office to sketch out equations. With the SmartBoard electronic whiteboard and an LCD projector, he can now import and browse through a Web site while scribbling equations—all of which are then captured as individual screen shots and sent back to the computer to be posted on his Web site. He could also use the whiteboard as a lecture tool in the classroom.

To keep his material fresh, Professor Luscombe likes to write what he calls "just-in-time" lectures only a few hours before

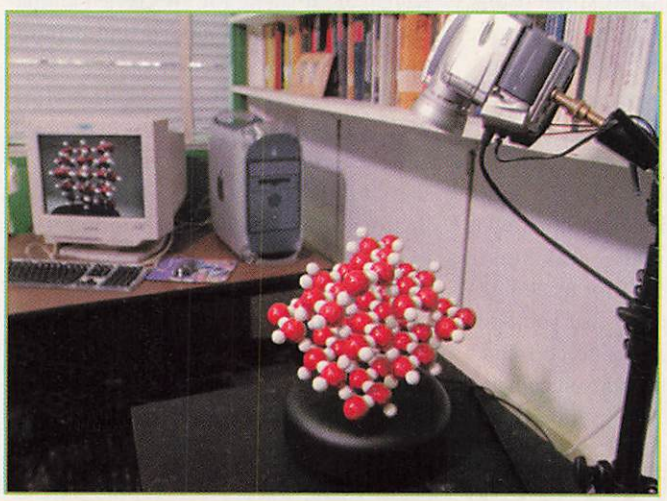
Read more about "The Art of Controlling Chaos" in the October Highlights at www.syllabus.com.



The SMART Board captures nanotube imaging from the Web via the Sun SPARC 20 computer. Annotations are recorded and captured on the computer's hard drive and can be uploaded to a course Web site.



The Elmo document camera photographs a 3-D model of the zinc blende lattice, which is sent to the Mac G4 for integration into course materials; documents are scanned with the Strobe Pro onto the Sun Solaris desktop environment where they can be organized into digital files.



Canon's Optura DV camcorder shoots a 3-D model of a crystal lattice revolving on the Kaidan turntable; Kaidan software installed on the Mac G4 records it for animated models that can be uploaded to the course Web site.

class begins. With his new technology tools, he can post that lecture on his Web site up to 30 minutes before class, providing students with supplementary material for that day's lesson. As for those sudden inspirations that occur to him during lecture, he can record them for later use with the Canon DV camcorder.

This month SyllabusWeb features a host of tools for enhancing productivity in the office and classroom. From scanning documents and images to create the paperless office, to recording and editing animations, to making presentations, these tools can make even the most Luddite among us more creative and productive. We asked Professor Luscombe if he had been converted. "Just one question," he asks. "Is this stuff *feng shui*?"

Smart Tools on Campus

Connect the SMART Board to a computer, and every touch on the Board will be interpreted by the computer as a mouse click. A presenter can then open, minimize, or close applications, scroll through files, open the browser—all just by touching the Board. The keyboard functions with a SMART Pen or by pressing directly on the Board and/or right click on the mouse (Windows only). Connect the SMART Board and computer to an LCD projector, and a presenter can write, draw, or type over any of the interactive software applications. Then save, print, or e-mail a complete record of everything written, drawn, or typed into the SMART Notebook. Elmo's HV 3000XG high-resolution 850Kpixel Progressive Scan CCD captures both 2-D and 3-D images with color reproduction. Featuring XGA resolution, it is ready for use with existing data and video projectors for multimedia presentations, and the standard USB port permits users to capture and download images directly to a computer hard drive for storage or manipulation. The camera comes with an onscreen menu, a mouse-controlled electronic pointer, wireless remote control, a 10x power zoom with auto-focus, and 15-frames-per-second capture speed. Visioneer's Strobe Pro NT integrates paper management software with the compact sheet-fed color scanner. The Scansoft software creates thumbnails of 38 file types, enabling the user to manage all electronic documents and images. Features include faxing, e-mail, and copying. The drag and drop feature allows users to drag a document thumbnail onto the link icon and send it to a variety of applications. The Kaidan-Autolycus DV Object Imaging Kit uses a motorized turntable and SpinImage DV software along with any DV FireWire-enabled camcorder to create 3-D object movies. The camcorder captures a video stream of a spinning object and converts it into a QuickTime VR or a Java-viewable object movie ready to be transferred to a course Web site. Canon's Optura100 MC takes high-resolution digital still shots as well as high-resolution video. As a digital camera, it offers three shooting modes—video, photo, and progressive photo. Video captures full-motion video for playback on a television, recording each digital photo for six seconds along with audio such as narration or ambient sounds. The progressive photo mode captures digital photos to a MultiMediaCard or a Secure Digital Card. Stabilization operates in both video and photo modes.

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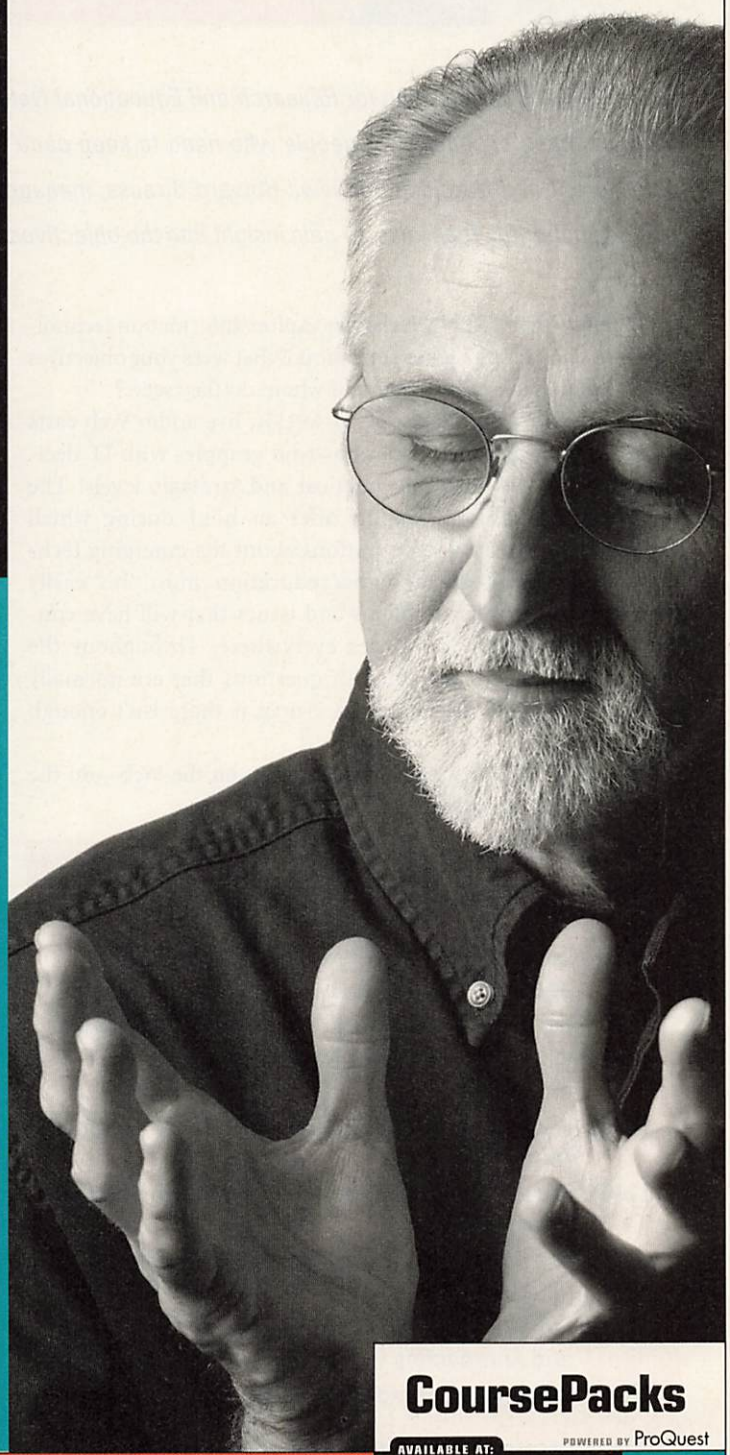

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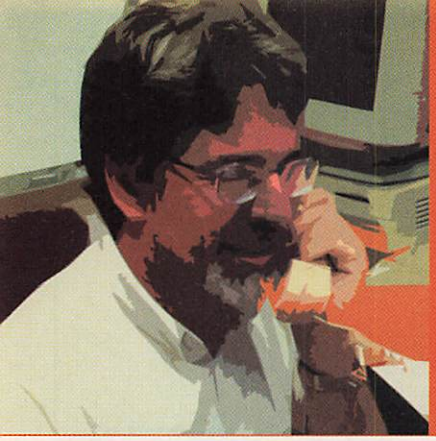

Inside CREN's TechTalks:

Q&A with TechTalk Anchor Howard Strauss

by Daryl Nardick

Since 1997, the Corporation for Research and Educational Networking (CREN) has been offering a series of TechTalks on the Web, intended especially for people who need to keep pace with information technology changes affecting higher education. Here, Daryl Nardick interviews Howard Strauss, manager of Academic Applications at Princeton University and technology anchor for TechTalks, to gain insight into the objectives and operation of these unique Web casts.

Q: I know that CREN's TechTalks explore information technology issues impacting higher education. What were your objectives in establishing these TechTalks and whom do they serve?

A: The CREN TechTalks are bi-weekly, live audio Web casts designed for everyone on campus who grapples with IT decision making—at both the practical and strategic levels. The idea behind TechTalks was to offer an hour during which experts are asked probing questions about the emerging technologies that will affect higher education most. It's easily accessible and covers problems and issues that will have considerable impact on campuses everywhere. Throughout the Web cast, listeners can e-mail in questions that are normally addressed live—or afterward via e-mail if there isn't enough time on the air.

Q: CREN's Web casts are done as audio on the Web—do the TechTalks ever use video?

A: No, because the TechTalks are not presentations. They are focused conversations. We decided to keep the Web casting technology simple—the only software needed to listen is a Web browser, which everyone has. Participation is open to everyone at no cost at www.cren.net—visitors just click on the TechTalks icon and listen in.

Q: How do you choose the topics and experts you present?

A: I don't make all of the selections myself—actually, anyone can suggest topics for future TechTalks and many people do. Most of the suggestions are from CREN members; some come from listeners. The CREN membership finally votes on an edited list of suggestions which results in the next year's schedule.

As for our experts, CREN staff recruits them from both member and nonmember institutions. You may have heard some of them before because they tend to be articulate people who are passionate about their work and are sought after as presenters at the conferences you are most likely to attend.

Q: How do you focus the questions of a TechTalk?

A: Every TechTalk is different; but there are a few things you can count on. We ask the strategic and practical questions that you'd ask of experts in their field. The questions draw out information that is compelling and directed at problems that higher education staff and faculty are facing today and in the near future.

The TechTalks always start with a few introductory questions from me to set the context and to explain the overall topic. Then there is an in-depth discussion between us, followed by questions from me and from our Web audience that explore further or help make more sense of what we have discussed. Finally, we ask the experts what steps colleges and universities should take now to take advantage of the particular technology we are discussing. On rare but important occasions the answer is for most of us to wait—if technology is not yet ready for prime time.

Q: Do TechTalks have corporate sponsors—and if so, does this create a problem in terms of how you present your topics?

A: We often do have sponsors to cover the cost of a TechTalk, but our sponsors exercise no influence over what questions we

Fall 2001 CREN TechTalk Calendar

9/20	Content Delivery Networks: How They Work and How They're Used
10/04	Securing the Network: Emerging Technologies
10/18	Video Over IP Networks: Where, When, How and Why?
10/29	PDAs: Where Are They and How Do We Support Them? Part I
11/01	PDAs: Where Are They and How Do We Support Them? Part II
11/15	The Smart Classroom: What Does it Look Like Today?
11/29	Software Licensing Strategies and Approaches
12/13	Building a Directory: What Are the Essentials?

Visit www.cren.net/know/techtalk/calendar.html for updated information on TechTalks. Archived TechTalks are available at www.cren.net/know/techtalk/archives.html.

ask or who we choose as experts. You may hear a quick thank you to a sponsor at the beginning and end of a TechTalk, but that's it. We won't present commercials or pitches for products.

Q: Don't you find that interruptions in the workplace make it difficult for listeners to participate in Web casts?

A: In my role as the TechTalk Technology Anchor, I hang a hotel-style tag on my door that tells people I am in the midst of a TechTalk. Based upon the effectiveness of that sign, we're now offering TechTalk listeners an official "Do not disturb. I'm listening to a CREN TechTalk" sign that you can hang on your doorknob. It also has the TechTalk schedule on it—you can order one or print one out from the CREN Web site.

Q: Are the TechTalks archived? Can you listen to one, once it's over?

A: Yes, absolutely—all the TechTalks have been archived as audio as well as transcribed to text. This is a treasure trove of information you can use anytime. We've been doing TechTalks since September of 1997 and have all 73 topics archived. For example, you can still listen to Help Desk Strategies done by expert Russ Vaught (Penn State) in June of 1998 and you can read and search every word of every question and answer in the transcribed Web cast. And Russ's Web references are also still there and relevant if you need help with your help desk. All the archives are on the CREN Web site, and everyone is welcome to access them at www.cren.net/know/techtalk/archives.html.

Q: Lots of organizations are offering Web casts now—is there anything particularly different about the TechTalks?

A: TechTalks focus on both the strategic and practical information technology needs of higher education. While practical information is often available from other sources, the strategic thinking is not. TechTalks are also much more than just Web casts. Every TechTalk includes a custom-built Web site that is a niche portal for that topic. And, as we've mentioned, all the TechTalks are archived, transcribed, and searchable on every word, both spoken and misspoken. TechTalks are aimed at decision makers—those people needing not only timely information, but also the insight of experts to make the right decisions about the purchase and use of information technology.

Q: The TechTalks seem very unrehearsed and open to surprises—are you ever actually surprised by the way a TechTalk progresses?

A: Well, the opening and closing remarks of TechTalks are tightly scripted to make sure we don't leave out anything critical. While we know in broad terms what the middle fifty minutes will be, they do tend to be very spontaneous and unpredictable. Listeners' e-mail can bring up topics never anticipated, and listeners will sometimes answer questions that have stumped our experts. The immediacy and uncontrollable nature of a live Web cast makes TechTalks great entertainment as well as an efficient way to keep up with information technology.

***Howard Strauss** is the manager of Academic Applications at Princeton University; howard@princeton.edu. **Daryl Nardick** is a consultant specializing in culture and technology; Daryl@HumanSideGroup.com.*

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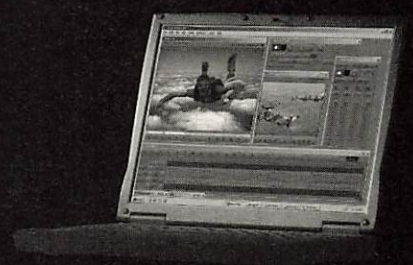

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A nine-site campus implements a portal to ease information transfer; a university partnership with a local company provides real world experience; and "old" technology bounces back from obsolescence.

TECHNOLOGY ACROSS THE CURRICULUM

No University is an Island

Hawaii Pacific University, a multi-campus university based on the island of Oahu, recently won the Pono Technology Award for its successful implementation of an academic technology plan that overcame both geographic and technological hurdles. The Pono Award recognizes Hawaiian organizations that successfully implement information technologies that improve the institution. Hawaii Pacific redesigned its campus information technology program, creating a solution that combines implementation of a campus portal to more efficiently transfer information, and a plan to take the university wireless within a couple of years.

Hawaii Pacific is spread over nine sites, and getting to each one is time-consuming. There are two primary campuses of HPU. The downtown campus is in central Honolulu and is much like any other urban campus in its layout. The Windward campus, tropical and suburban, covers 135 acres 15 miles from the downtown campus. In addition, HPU operates seven other facilities at military bases spread all over the island. According to Joe Schmiedl, HPU's Assistant Dean for the Adult Service Center, HPU was wasting a lot of resources trying to connect the many sites through traditional means. "Because students may attend classes at any of our campuses, and because we need to share information from site to site, we were spending a great deal of time and energy providing services to each location."

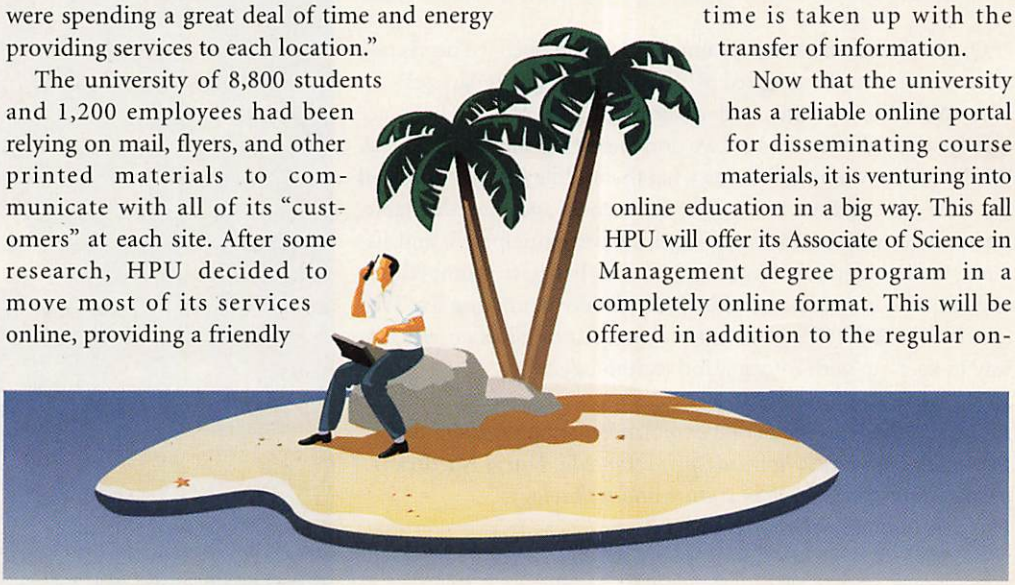
The university of 8,800 students and 1,200 employees had been relying on mail, flyers, and other printed materials to communicate with all of its "customers" at each site. After some research, HPU decided to move most of its services online, providing a friendly interface where all of the campus constituents could find information on an as-needed basis. HPU's Chief Information Officer Justin Itoh calls this "self service," a trend he has seen in technology implementation for some time. To provide the interface, HPU turned to Campus Pipeline, which created a custom portal called HPU Pipeline. The Campus Pipeline platform integrates with existing SIS systems and SCT, which produced HPU's registration software.

Schmiedl notes that the Pipeline system frees up people who provide campus services such as the registration and financial aid staff, and gives them the capability to deliver services to students in a convenient, timely manner. "We reduced the time it takes to process grades by 11 days," he says. "Now this happens much faster, giving students immediate access to their results, and helps us get information like the Dean's list and suspension and probation lists faster to offices who need that information, like financial aid."

Citing another example of the efficiency of the new system, Schmiedl points out that recently he was able to fill a campus staff position in three days rather than three weeks because he posted the vacancy online and response to the posting was immediate.

In addition to moving information more efficiently, the new system has helped HPU realize some cost savings in terms of printing, postage, and staff salaries, as less personnel time is taken up with the transfer of information.

Now that the university has a reliable online portal for disseminating course materials, it is venturing into online education in a big way. This fall HPU will offer its Associate of Science in Management degree program in a completely online format. This will be offered in addition to the regular on-



campus program, which is identical in content and coverage. Instructors throughout the institution will also begin offering individual online courses that will utilize e-mail, chat rooms, and message boards. In addition, online resources that the university can funnel through the portal will save students a lot of off-island dial-in connection costs.

The university will conduct an assessment of the online offerings in October, examining every aspect of it, including the school's ability to adequately deliver online student and library services. If the new online degree program is judged to be a success, HPU may offer similar degree programs in the future.

This fall HPU will take another giant leap when it implements a completely wireless system at its downtown campus. According to Itoh, this is a very important move that will better provide computer support to HPU students. "Our computer center doesn't adequately support our students' needs," he says. "Moving them all to a wireless environment allows us to support them all and eliminate the long wait for a computer ." In addition to Internet access, the wireless network will provide students with applications such as SPSS, System Architect, and Visual Studio—applications that are expensive for them to purchase individually.

"We're very proud that we can now extend wireless access to non-public campus areas," says Itoh, "freeing up our students to do their coursework wherever they're most comfortable."

For more information, contact ***Joe Schmiedl*** *or* ***Justin Itoh,*** *jschmied@hpu.edu and jitoh@hpu.edu.*

CyberLab Gets Down to Business

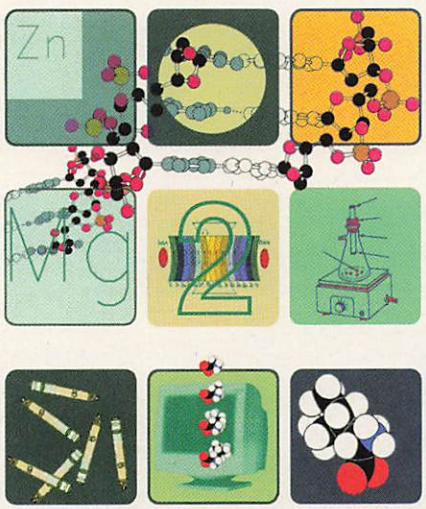
Beginning this fall, Indiana University Purdue University Indianapolis (IUPUI) students are participating in research and development in a real-world setting, thanks to a partnership between IUPUI and VIFI, a local technology company.

The students, IUPUI undergraduates, will intern in the school's CyberLab, which has been relocated to VIFI's Indianapolis headquarters. The CyberLab has been the school's information technology research and development facility for several years, producing such ventures as the OnCourse course management system and its commercial cousin Angel. The move to VIFI's campus is a deliberate strategy to take students out of the academic setting and put them into the everyday world of the technology industry.

According to Ari Jafari, computer technology professor and head of the CyberLab, the student interns will benefit tremendously from the partnership. "We've always built real products here. But at VIFI, students are going to learn about working in a real team setting, about R&D, and about getting products to market."

Students will work in product teams on both CyberLab and VIFI projects. They come from a broad range of backgrounds and majors. "They're not all programmers," says Jafari. "We need business students for marketing and English majors for technical writing. Prior experience is not the issue. We hire students who want to learn and work hard." Each unpaid intern will earn six credit hours from IUPUI for two semesters of internships. The internship is pass/fail, and intern selection is competitive.

"We tell them that they must be very motivated to succeed," says Jafari. "This isn't like a course where they can settle for a B instead of an A. They have to do A



work every time in this situation." Students will commit to working at least 15 hours per week in the CyberLab.

VIFI will provide workspace, equipment, and an endless supply of free snacks and soft drinks, as well as a corporate atmosphere that encourages fun (a pool table and foosball game are on site). VIFI president Mike Winter notes that the new partnership benefits VIFI as well. "In this joint venture, we gain an opportunity to meet talented students who are potential future employees," he says. "They'll help us get a couple of projects done along the way." He also points out that the partnership is a rare example of business and academia working collaboratively. "We're building connection points between the two, helping to bridge the gap between academia and the real world of business."

The IUPUI CyberLab will continue to focus on developing educational tools, including a new project—an electronic portfolio tool for students. The project, a collaboration of IUPUI, UCLA, Penn State, and Florida State, is typical of the CyberLab's "educator-to-educator" focus. CyberLab interns will also work on VIFI projects, under the mentorship of a VIFI manager. VIFI, a financial services technology company, is known for its Internet banking, cash management, and credit card services. They have no plans to enter the education technology market.

Eventually, Jafari hopes to expand the lab, bringing in research fellows and post-docs both on site and in a virtual capacity. He also hopes to expand the internship program to include Indiana's most talented high school computer students as well as a larger group of university students.

For more information, contact ***Lyn Mettler,*** *Media Relations Coordinator, IUPUI, lmettler@iupui.edu.*

From Dumpster to Desktop: Combining Old Technology with High-Tech Tools

Often, adopting new teaching technology requires coping with transferring analog materials to digital formats and having to discard the "old" technology completely. Sometimes the amount of work involved in digitizing documents and learning a whole new approach to presentation is so burdensome that it's easier to maintain the *status quo*. Perhaps there's a middle ground, however, that takes advantage of the new tools without forcing existing materials into obsolescence.

One such solution is working for Douglas Navarick, professor of psychology at California State University at Fullerton since 1973. Navarick's introduction to psychology courses typically enroll 100 to 120 students in a large, theater-style classroom. Last year, the Southern California campus upgraded the lecture hall, adding a high-resolution LCD projector, a large screen, a powerful computer that is always online, DVD and VCR capability, and remotely operated carousel slide projectors. Navarick was interested in taking advantage of the new classroom appliances, but wanted to find a way to continue using the images and other materials he had collected over many years of teaching—hundreds of carousel slides, films, and transparencies.

Experimenting with PowerPoint gave Navarick the idea to combine electronic presentation tools with his traditional materials. "I started using PowerPoint to recreate some of my lecture materials," says Navarick, "and one thing led to another."

Navarick has developed three techniques. First, he sets up PowerPoint on the large screen with a black background and projects his carousel slides onto the screen. He can then use the PowerPoint pen as a pointer, which he says is very visible to his students, or as a tracing tool to circle, underline, or label slides. For instance, he might label a graph that his students are viewing. "Doing the labeling or circling while students are watching keeps their attention focused much better than having things pre-labeled," the professor of learning and memory notes.

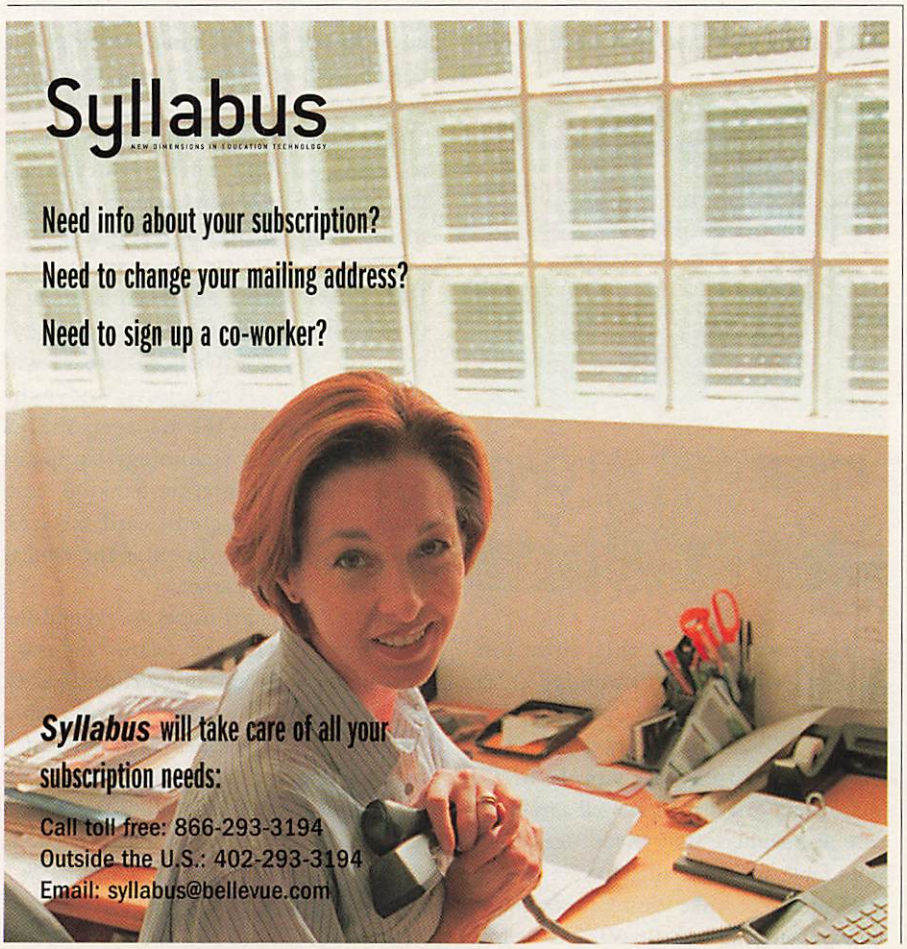
His second technique uses a similar setup, but with Word's background (in black) as a replacement for PowerPoint. Navarick then can type captions or comments under or over a slide, using large-font white type on the black background.

His third technique is to caption films while students are watching them in the lecture hall. While some professors have switched to videotapes, CD-ROMs, and DVDs and no longer use films, Navarick still relies on film in cases where the videotape quality is less sharp or no videotape version exists. "I found out that the media department was throwing out all the movie projectors, so I ran over and saved one from the dumpster," he says.

While showing a movie, Navarick used to have to interject his comments aloud, but he says that students were very distracted by this. "Some students don't listen or don't hear you, and then you find yourself repeating it over and over. This way, the definition or comment is right on the screen, and students can watch as you type it. Having it appear before their eyes is an attention-getter."

Although this pedagogical approach does require one to work simultaneously with PowerPoint, an LCD projector, and a slide or movie projector, Navarick finds it easy to manage. This approach allows him to reuse existing materials and save time digitizing documents. Best of all, there are absolutely no costs involved in teaching this way, since neither he nor the university has had to purchase anything. Navarick has all the tools he needs to continue his teaching approach indefinitely while he gradually builds a set of digitized and Web-based resources.

For more information, contact ***Douglas Navarick****, dnavarick@exchange.fullerton.edu.*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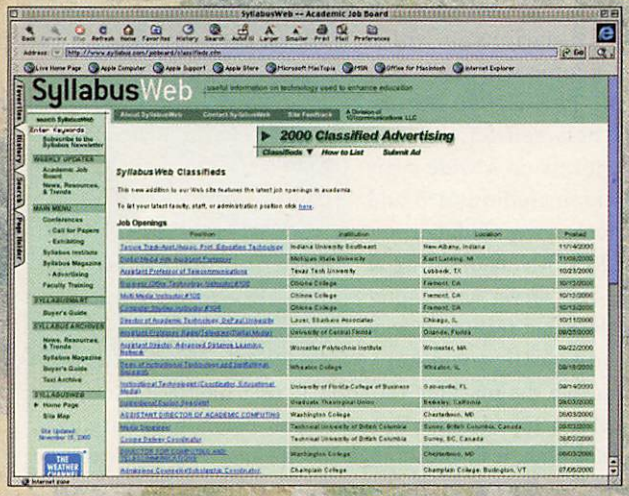

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The Rainbow Effect: Advancements in Color Printing

Printing in color has become relatively inexpensive, but all color printers are not the same. Here we've surveyed four distinct printer models ranging from a low-cost model offering advancements for its price range to high-end machines appropriate for networked printing.

The **Epson Stylus C80** printer offers a breakthrough in ink technology. The new DuraBrite Ink, in four individual cartridges (cyan, magenta, yellow, and black), is a pigment ink, rather than traditional dye ink. The pigment ink rests on top of the paper without bleeding or fading. Durable and water resistant, it is ideal for wet lab use or for printing documents that might be used outdoors. Individual cartridges mean that users need replace only the one that runs low, rather than throw out an entire color cartridge when one color is depleted. The cost of the three separate color cartridges is comparable to one three-color cartridge.

The C80 also features Epson's Micro Piezo technology, a process that injects up to three different sized ink droplets, depending on the needs of the image. The unit prints at an impressive 20 ppm (pages per minute) in black (10 ppm in color), and features auto-edge smoothing, which enhances the look of low-resolution documents like Web page printouts, and improves skin tone replication. The unit is available in wired or wireless networking models. The duty cycle (number of pages that can be printed per month before a user would have to be concerned about equipment failure) is 5,000 pages. At $149 after a $30 rebate, this printer offers a lot for the money. **www.epson.com**

The Xerox Phaser 860B uses single-pass solid ink technology to print both black and color copies at 16 ppm. It lists for $1,999 and up, depending on features. Although it and the other printers featured here list at a much higher price than the Epson, the performance is also considerably higher. With 64 MB of RAM and a 5GB hard drive, the 860 offers network models and a duty cycle of 65,000 pages per month, making it appropriate for shared-printer situations. Xerox also supplies free black ink for the life of the printer, reducing overall costs somewhat. Average costs per page range from 0.5 cents for a black-and-white business letter to 1.1 cents for color. The cost increases as more ink covers the page—when printing a color photo or graphic, for instance. The 860 uses Adobe Postscript language, an advantage for graphic arts uses, and the Advanced ColorStix II ink provides improved page "feel" and more pages per ink stick. **www.xerox.com**

The **C7000 series** from Oki Data, recently ranked the top 12-ppm laser printer by *PC World* magazine, features single-pass color technology to apply color in one pass using four LED print heads and image drums. In monochrome, the printer operates at 20 ppm. The C7000 series uses oil-less toner, which the manufacturer claims gives documents a more "elegant and translucent" look. With 64 MB of RAM and a 5GB hard drive, the unit is comparable in power and memory to the Xerox 860B. Oki also includes 550-sheet second and third paper trays and an optional automatic duplexer for two-sided printing—both important for situations in which several people will share one printer. The C7000 series, priced between $3,499 and $7,499, prints on a wide array of papers, including card and index stock. **www.okidata.com**

The **Riso RN2000**, listing at $7,995, also serves as a copier and is the most feature-rich of the products surveyed here. Users operate the machine via an LCD user interface panel. The unit's color array includes the usual four colors plus burgundy, fluorescent pink, teal, and orange. The printer-duplicator can be networked to allow users access from their desktops. This powerful machine prints 60 to 130 ppm, depending on settings, has a paper capacity of 1,000 sheets, and features zoom and reduction settings. Environmentally conscious buyers should note that the RN2000 uses auto sleep and auto power off, prints well on newsprint and recycled papers, and is free of ozone emissions, toxic fumes, flammable liquids, and UV light. **www.riso.com**

Most printers use a process called xerography, which involves exposing an electrically charged photoconductor to light. The light causes the charged particles to dissipate, creating the image that will be printed. Toner, tiny particles of plastic dust, is attracted to the charged areas of the photoconductor, and then transferred to paper by heat fusion. The printing process occurs using one of three technologies. **Laser printers** rely on a laser beam to bounce light off of a rotating mirror onto the photoconductor. **LED printers** use semiconductor technology rather than lasers, complex lenses, and mirrors. Fewer moving parts mean fewer mechanical breakdowns. **Solid ink printing**, a proprietary technology available only in some Xerox printers, uses specialized ink that remains solid until melted by the heat of the printing process. Unlike water-based inks used in many inkjet printers, solid ink is durable, water-fast, and vibrant.

Most printers use four colors to print any color document, though some photo enthusiast models use six. The ink is stored in cartridges and called forth as needed. Usually, color is applied in a four-pass process: The photoconductor goes through four successive printing cycles to transfer the desired amount of color, one at a time, to the page. For this reason, color printing operates four times slower than monochrome (black) printing. However, recently developed single-pass technology relies on four photoconductors (as well as four lasers or LED imaging systems) to simultaneously print all four colors, dramatically improving printing speed. While these printers are more expensive than four-pass printers, the price difference is shrinking.

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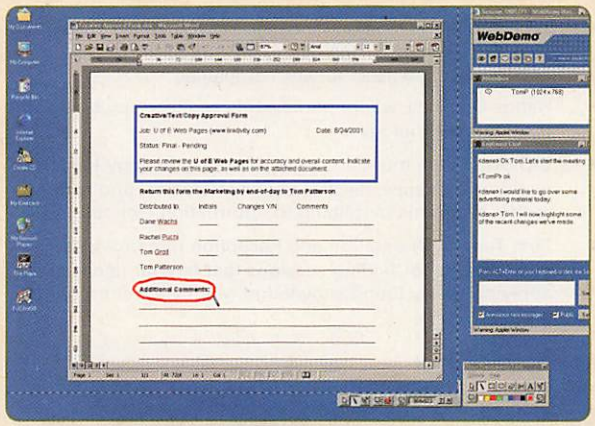
WebDemo: Seeing—and Hearing—is Believing

by Sharon Gray, Augustana College

WebDemo, from SpartaCom, is a beautifully simple software solution for collaborating over the Web. Requiring only a Web browser and a computer connected to the Internet, participants from multiple sites can communicate visual information combined with simultaneous live voice communication.

Features

The host's console has six icons and fits in a small window that can be positioned anywhere on the host's screen. From there, the host can set up the "viewport"—a window that can be positioned anywhere on the screen, and can be resized at any time by clicking and dragging. Anything the host positions within



the viewport window is broadcast to the other participants—anything left on the desktop is not broadcast.

Participants can share PowerPoint slideshows, explain CAD/CAM diagrams, co-browse live Web pages, or share virtually anything that can be shown on a computer screen. This extreme flexibility is possible because the actual visual information shared is an image of the viewport window. It is not necessary that the shared applications reside on other participants' computers.

But the image in the viewport is more than just a live picture of the host's computer screen. The host can transfer control of what is in the viewport to participants, allowing users to open programs, type text, insert or delete objects, and modify what is on the host's screen within the viewport. This means that remote users can add or modify PowerPoint slides, work on CAD/CAM diagrams, or edit word processing documents, among other things.

One of the six icons mentioned earlier allows the host to view lists of participants and their connection information, including screen resolutions and connection speeds, so that hosts can adjust their presentations to meet the limitations of participants' connections. The host can actually see when each participant's data transfer is complete, and know when the participant can see the entire visual. The host can also transfer hosting rights—including viewport—to anyone on the attendee list. The host can grant and revoke remote control of viewport content at any time.

WebDemo allows both one-way and two-way voice communication. The host has access to full-duplex voice chat—allowing simultaneous talking and listening. Participants have access to half-duplex voice chat, allowing each to either talk or listen, but not both at the same time. Because current voice-over-Internet technology presents some lag problems with two-way voice communication, a phone conference call may prove more workable in some situations. If two-way voice communication is not required, however, voice-over-Internet works well for one-way broadcast, and keyboard chat provides satisfactory two-way communication. The WebDemo host can enable keyboard chat for all or selected participants, and each can "raise a hand" by right-clicking in the chat window. The host is then alerted by a flashing username in his or her own chat window.

Applications

Ideal for help-desk use, WebDemo lets technicians view a user's screen (with the user's permission) rather than rely upon verbal descriptions. Technicians can diagnose problems by remotely taking control of a user's desktop, allowing technicians to serve greater numbers of staff or students. WebDemo also provides opportunities for training and development: Users can learn a great deal when technicians assume control of their desktops and demonstrate solutions and workarounds.

As a presentation or demonstration tool, WebDemo allows instructors to share visuals and talk about the images at the same time. Whiteboard tools let the host mark on the visuals, circling key elements, enumerating points, and highlighting ideas. Students can ask questions using either voice or keyboard chat.

Implementation

WebDemo requires very little bandwidth since the actual data exchange is facilitated through a Java script. It can function with a 28.8 dial-up modem connection, but runs best with a high-speed Internet connection.

WebDemo is available as either a server product or as a hosted solution. The server product pricing is based upon concurrent users and is probably beyond the means of most individual faculty, but may be within the means of individual departments. The hosted product pricing is an annual license and is based on concurrent users. It is more likely within the reach of individual faculty members, and is likely within the means of most departments. Licenses are based upon concurrent users rather than set user login accounts, providing flexibility for departments wishing to allow different professors to use WebDemo with different sets of students at different times, up to the concurrent user limit. This type of license also works well for help-desk use: Technicians can help as many users as the concurrent user limit allows.

Sharon Gray is an instructional technologist at Augustana College. gray@wise.augie.edu

PRODUCT SUMMARY

Wireless Technologies: Expanding the Range of Options

The **Blue Wolf Wireless Campus** relies on personal digital assistants (PDAs), cell phones, handheld computers, and two-way pagers to connect students and faculty to campus services. The Blue Wolf solution, relying on completely portable and relatively inexpensive hand-held devices rather than laptop computers, leverages a campus's existing data from its back-end, course management, and portal systems. Customers using these miniature communication devices can customize the look and feel of the wireless channel as well as its content. **http://wireless.bluewolf.com**

Colubris CN 1050 technology is appropriate for distance learning situations, in which satellite offices share a single Internet connection via cable, DSL, or broadband wireless modem. Colubris uses VPN technology to create a secure "tunnel" to a remote server. The built-in VPN server creates a secure wireless connection for each wireless station, and the onboard Hifn chipset maximizes throughput by handling all encryption tasks. For added flexibility, the CN1050 also includes support for 40/128-bit WEP encryption. CN 1050 includes a firewall customizable for appropriate rules. In addition, Colubris provides integration with legacy Ethernet LANs. **www.colubris.com**

The **SONAbeam** product line from fSONA is designed primarily to solve geographic problems for short-distance data transmissions. fSONA offers point-to-point, line-of-sight, full duplex synchronous transmission at fast speeds using eye-safe lasers. The beams can carry information at data rates up to 1.25 Gbps over a propagation distance of 2.5 miles. Significantly less expensive than laying optical fiber, this system, consisting of two transceivers and a backup microwave link, is deployable within 24 hours once line-of-sight access is available. For links across a mile or more or in areas where buildings may sway, the fSONA dynamic beam tracking system relies on a custom-designed frictionless gimbal that takes into account building movement and inclement weather. **www.fsona.com**

NextNet Expedience is a non-line-of-sight broadband wireless access system designed for rapid deployment of high-speed, two-way voice and data services over the "last mile" of the communications network. NextNet uses radio transmission, rather than lasers, and focuses on providing high speed, low-cost wireless Internet access for residential and small office or home office users. Their CPE (customer premise equipment) integrates the modem, transceiver, and antenna into a single compact indoor unit completely installable by the customer. The integrated CPE combines plug-and-play functionality with OFDM radio transmission reliability. The CPE unit connects to any IP-based device via a standard Ethernet connection, and supports single or multiple users on one subscriber connection. **www.nextnetwireless.com**

A campus will move from a wired network to wireless technology for a variety of reasons. Perhaps the wired network doesn't reach every location in a distance learning program, or the campus decides to go wireless to allow students complete mobility. Sometimes geographic barriers necessitate a technology that can literally leap tall buildings in a single bound. Whatever the reason, deciding to go wireless is only the first step. After that, an institution has to research and choose the best wireless solution for a particular campus or system. As with wired networking, the number of variations available in wireless technology is staggering. Here we've surveyed some options that address campus-specific needs, from handheld devices that replace PCs, to single-office Internet connections, to laser transmission that beams data from point to point.

RoamAbout R2, from Enterasys Networks, is a customizable and expandable wireless platform that allows users to maintain connection to the network from any location on campus. The RoamAbout PC card uses radio frequencies instead of a LAN connection, switching access points as the user moves about the network. The Enterasys outdoor RoamAbout allows customers to quickly establish high-speed connectivity between buildings without the inconvenience of installing cable or the recurring expense of leased T1 lines, providing a solution for extending wired LANs or building wireless LANs. Wireless users can run high-bandwidth applications previously available only from traditional wired networks. These features create a smooth technology migration, eliminating the need to upgrade an entire infrastructure or discard previously purchased PC radio cards. **www.enterasys.com**

Symbol wireless local area networking 24 is a technology solution that relies on handheld devices. The goal is to overcome insufficient or inconvenient data drops, provide students with ready access to technology tools, and simplify technology use for teachers. The handheld devices free teachers and students from the wired classroom, allowing learning to take place anywhere—in the gym, on the quad, or in the dorm. Administrators, teachers, and security personnel have instant access to student records. Bar code laser scanning facilitates the creation of a mobile, interactive classroom. **www.symbol.com**

ZoomAir wireless networking products extend networks for short distances and are especially suitable for short-term solutions such as campus festivals, fairs, or other off-the-wired-network events. The products provide a range of up to 300 feet indoors and 1,000 feet outdoors, an 11 Mbps data rate, and Windows 95/98/NT/2000 drivers. AP11 Access Point Hardware connects a ZoomAir or other similarly compliant wireless network to an existing wired Ethernet LAN, extending the range of the wireless network. This solution utilizes existing PCs and extends the range of ad-hoc setups (using the full radius around a centered access point). The LAN to LAN Bridging Kit solution establishes a permanent wireless link between LANs in separate buildings or facilities within line of sight of each other. **www.zoom.com**

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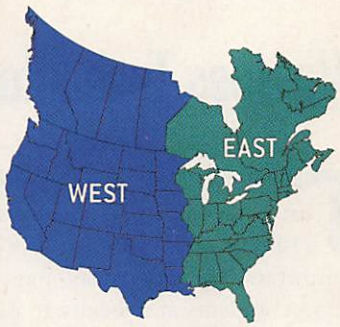

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